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THE  
PICTURESQUE  
GEOGRAPHICAL READERS

BY  
CHARLES F. KING

FOURTH BOOK

THE LAND  
WE  
LIVE IN  
PART II



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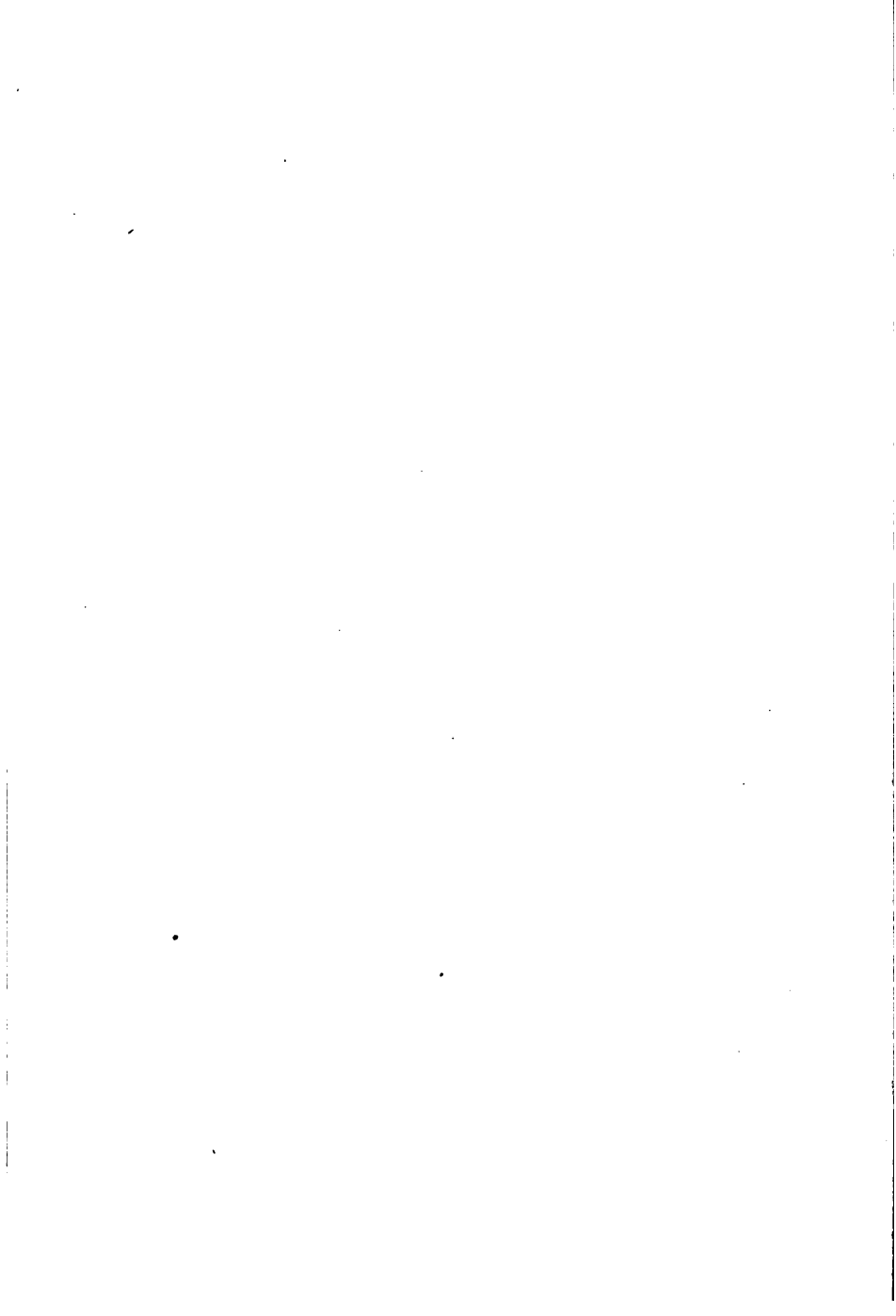
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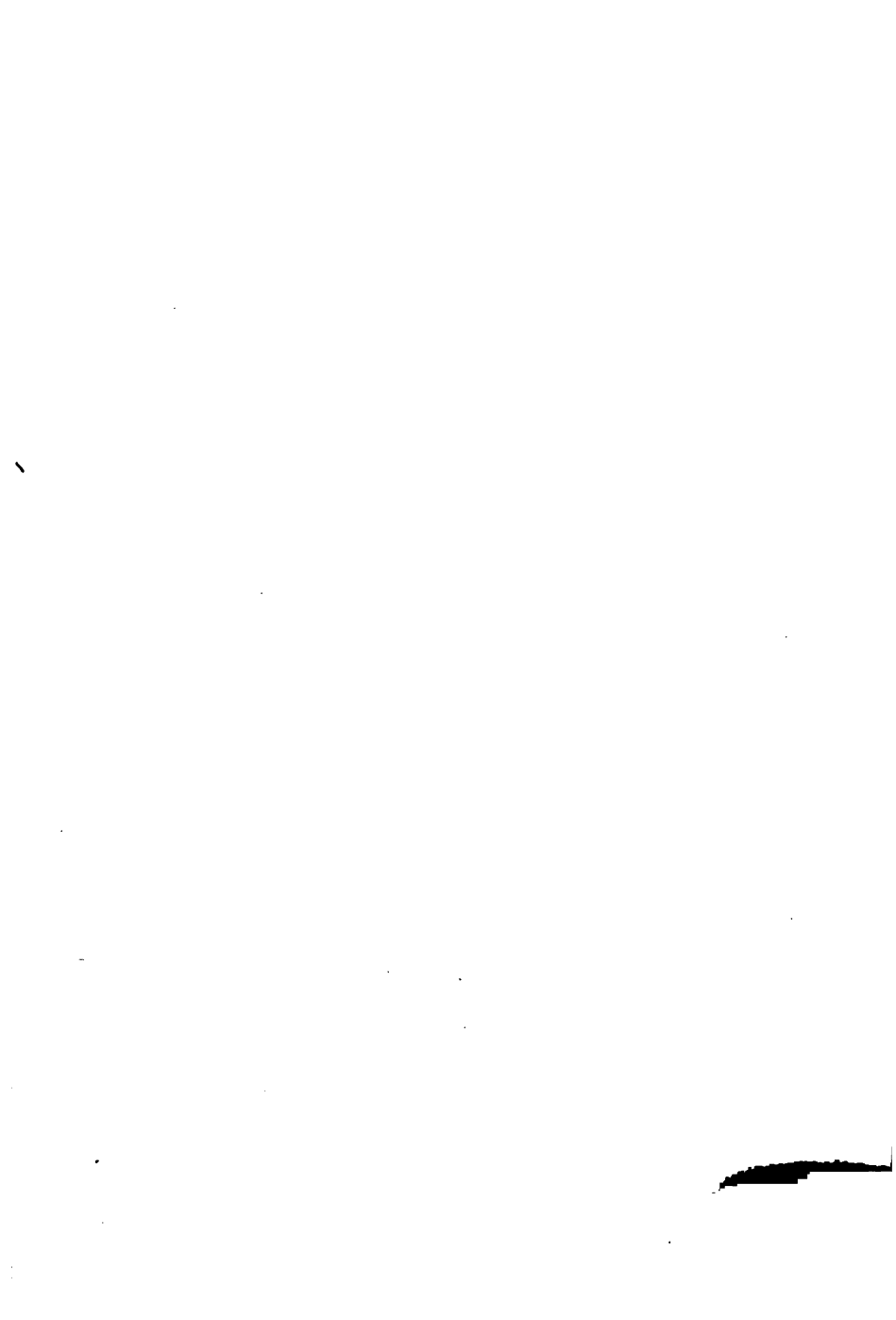
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# **METHODS AND AIDS IN GEOGRAPHY**

**FOR THE USE OF TEACHERS AND NORMAL  
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**BY**

**CHARLES F. KING**

**HEAD MASTER OF THE DEARBORN SCHOOL AND FORMERLY SUB-  
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BY  
CHARLES F. KING  
MASTER DEARBORN GRAMMAR SCHOOL, BOSTON; AUTHOR OF  
"METHODS AND AIDS IN GEOGRAPHY"

FOURTH BOOK  
THE LAND WE LIVE IN

PART II.  
*Supplementary and Regular Reading*  
IN  
THE LOWER CLASSES IN GRAMMAR SCHOOLS  
PUBLIC LIBRARIES AND THE HOME

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## PREFATORY NOTE.

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A THOROUGH knowledge of one's country is a prime condition of intelligent citizenship. This knowledge should first come to one in school, under intelligent instruction and carefully arranged facts. Children are always interested in all that concerns the land they live in, and find greater delight when the matter is properly presented, in learning about its natural beauties, its productions, cities, people, than in studying about other countries.

It has been the aim of the author of these Readers to collate and present in as attractive a manner as possible the striking facts of the United States. The amount and number of interesting facts collected made it necessary to issue these in three volumes convenient to handle and satisfactorily complete in information. Book III. Part I. takes up the New England and Middle States; Book IV. Part II. mainly describes the Southern, Middle, and Central States. Book V. Part III. describes the Rocky Mountains and Pacific Coast.

The present volume is designed for children in the fifth and sixth years of school life, but it is well adapted for more advanced grades. Teachers and adults will here find a vast amount of information not usually given in the regular text-book, — information obtained only from personal

observation and inspection, or from recent published works of faithful travellers.

Friends who have resided for years in several places described, have kindly assisted the writer in reading proof, thus providing accuracy in details. Nearly all the pictures in this volume have been made from photographs, many of which have been taken especially to illustrate these chapters. Beauty and exactness are thus happily combined.

The ordinary scope of geography has been in this series of Readers enlarged so as to embrace the business life and labor of the present day. Leading manufactures, mining industries, agriculture, domestic commerce, methods of transportation, the people of the country, have each received careful attention, in the belief that such knowledge will prove both useful and interesting.

The great question at present before educators is how best to economize time and save unnecessary labor. One of the wisest ways to accomplish this is to learn how to do two things at once. The geography lesson supplies ample material for language lessons, for spelling, or for composition. The poetical selections in Chapter XIX. are well adapted for memorizing. Helps to the teacher in this direction are several times introduced at the ends of chapters, as mere suggestions. Teachers are urged to carry out these ideas more fully in their daily work.

THE AUTHOR.

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# THE LAND WE LIVE IN.

## PART II.



### LESSON I.

#### SOUTH TO FLORIDA.

THE Cartmell family stayed a week or more in Washington, as related in the last chapters of Part I. They enjoyed the Capital to such a degree that they were surprised that time had passed so swiftly.

"Now," said Mr. Cartmell, "it is best for us to depart southward, to a warmer clime."

"We are all ready," said the children, "although we have enjoyed Washington so much."

The ride through Virginia, "the home of Presidents," was interesting, because Mr. Cartmell told his children about the plantation life of the South, which formerly resembled somewhat the life of the nobility in Europe. In both cases there were great estates under one manage-

ment; great mansions with fancy names, such as "Oakland," or "Rosewell," or "Stanton Hill;" many servants, generous hospitality, high culture, lofty ideas, happy homes, and intense love of country and State.

"What other crops are raised here besides Presidents?" Mr. Cartmell asked.

"Sweet potatoes, tobacco, and peanuts," replied George.

"Our best sweet potatoes come from about Norfolk. The tobacco crop has so exhausted the land that Kentucky now raises more tobacco than this State. Many of these fields which we see from the car window are beautiful in spring with the crops that George mentioned. Peanut stacks we are frequently seeing in the fields near the train, as we pass along."

"Do *peanuts*, Papa," Nellie asked, "grow *in* the ground, or *out* of the ground?"

"The peanut plant blossoms when about ten inches high. Soon after the plant falls over, and runs along the ground like a vine. The flowers fade and fall off, and the pods are forced into the ground, and the seed ripens in the warm earth about the time of the first frost. A plough is run under each row to throw out the pods, and the vines and pods are made into stacks in the field in order that the nuts may become thoroughly dried. The peanuts are picked from the vines by hand in the winter time, and sent to the Northern cities, where they are so much liked."

A short stop was made in Richmond to see the city, and visit the capitol, which contains Houdon's celebrated statue of Washington, and other famous statues. While riding through the beautiful streets they saw many tobacco factories and flour mills.

Mr. Cartmell took a Pullman Sleeper at Richmond on the Atlantic coast-line, at 3.36 P. M., and the next morning he and his family were in Charleston. They found the climate balmy and pleasant, although it was in winter time. The city seemed to be built upon low and level land at the extreme end of a peninsula between two rivers, — the Ashley and the Cooper. The Battery here, as in New York, appeared to be a popular promenade, lying near the water's edge, and commanding a fine view of the harbor.

In going from Charleston to Savannah Fred noticed a number of very level fields, partly flooded, along the banks of the rivers, and which seemed to be cultivated.

"Papa, what do they grow in those fields?"

"Those are **rice** fields, my son."

"Please tell us how rice is cultivated."

"Rice requires to be grown on land which can be flooded and drained at the will of the rice farmer. The land is prepared by making embankments and ditches, so that water can be turned on when needed from the river or some other source. About this time of the year



RICE PLANT.

the land is ploughed or dug over with the hoe. I have seen men at work in these fields several times lately, for we are now in the greatest rice-raising State in the Union. After being ploughed, the land is covered with water for the rest of the winter. In March the water is drained off, and the land kept dry.

"The seed is sown the last of April, or the first of May. It is covered lightly with soil, and then the water is let on. The water is allowed to remain till the seeds sprout, which is in about six days, when it is again drawn off. In five or six weeks the plant is 'hoed,' and the 'long water' is put on for two weeks. At the end of this time the water is again drained off, and the grain hoed once more, after which the land is again flooded for two months, or till the rice matures."

"Why, Papa, I never supposed there was so much work in raising rice!" exclaimed Nellie.

"There is much more to be told, my daughter. Rice is a grain, and grows about three feet high, on a stalk like wheat or oats. It is cut with a sickle, bound into sheaves, and stacked. When thoroughly cured it is threshed by machinery. The grain or rough rice is called 'paddy.' In this state it is frequently shipped to New York, where it is milled, that is, separated from the hulls; then it is sorted, and the prime rice is cleaned and polished."

"Where is rice largely raised in this country?"

"In the two Carolinas, in Georgia, Louisiana, and Texas."

As Mr. Cartmell finished his description of rice culture, the train approached the Savannah River, and after crossing the iron bridge, they entered the city of Southern culture and wealth. They found Savannah a

city laid out regularly with broad shaded streets and many open squares. The residences were mostly surrounded with flower gardens, which were in bloom as if it were June.



CABIN HOME.

In this southward trip Mr. Cartmell paid considerable attention to the appearance and surroundings of the negroes. He saw many humble, but apparently happy and contented, "cabin homes." He found the negro was

attending school, and learning to read; he was working in many ways, and laying up money, and slowly becoming like other folks in the country.

In one place they saw quite a group of the children just out of school, standing by their teacher.



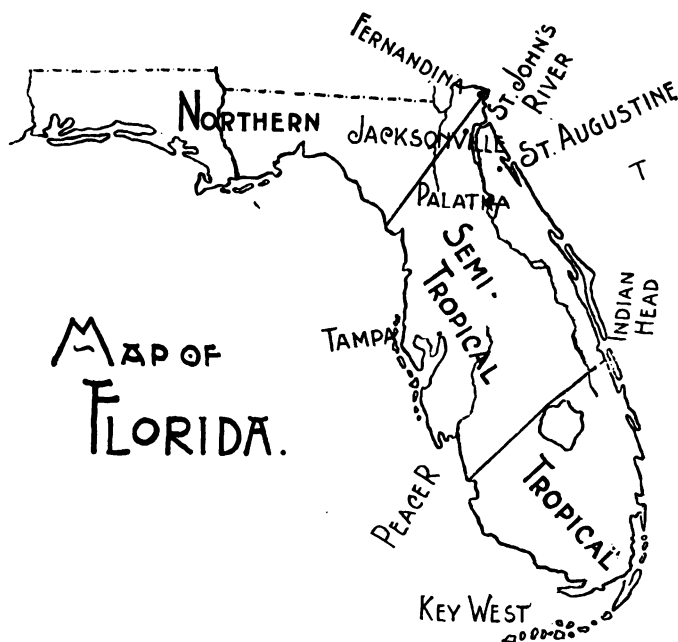
SCHOOL CHILDREN, FLORIDA.

After leaving Savannah the next day, Mr. Cartmell remarked, —

“We must remember that Florida is a very large State, extending from north to south through four hundred and fifty miles, from a temperate to a tropical climate. It is at the same time very narrow, — a long narrow peninsula, washed along its eastern coast by the warm waters of the

Gulf Stream. Florida is also very low, the highest point in the State being five hundred feet above the sea.

"This State is naturally divided into three divisions. The *northern* division is temperate, and is a land of live-



stock, wheat, potatoes, rice, and grapes. Frosts and cold snaps are possible there.

"*Semi-tropical* Florida lies between the twenty-eighth and thirtieth parallels. Here flourish the orange, lemon, sugar-cane, and garden vegetables. These are shipped to the North in great quantities in January, February, and March.

"South of this belt is *tropical* Florida, noted for its bananas, pineapples, and cocoanuts."

A ride of five hours, over a poorly built railroad, brought Mr. Cartmell and his family to Jacksonville, on the St. John's River, in the northeastern part of Florida. They were happily surprised to find this so handsome and so prosperous-looking a city. The streets, as they saw them, were wide, and nearly all lined with rows of very large live-oaks. Bay Street was the principal business thoroughfare. Horse cars ran through this street from the station and by the St. James Hotel, where they stopped.

The next day the Cartmells took a trip up the St. John's River. They were constantly standing or sitting in the forward part of the steamer to observe the novel and ever-changing scene. They saw in this ride many strange birds, and, in the distance, saw and heard the great alligators as they plunged headforemost into the water. The shores in many places were lined with palmettoes, live-oaks, cypresses, and willows.

Every few miles they came to small villages containing numerous cosy, airy, and neat homes. The orange-groves, gardens, lawns, fences, and piers gave evidence of comfort and good taste.

About sixty miles south of Jacksonville, the steamer stopped at a new and growing town by the name of Palatka. This beautifully situated place stands at the head of a large bay on the western shore of the river, on a high, broad plateau. There are several fine hotels in the place, which is considered very healthy; the town is also noted for its many gardens, in which are raised such vegetables as green peas, cucumbers, celery, lettuce, beets, tomatoes, etc. These are sent North in spring time, and sold at good prices. Palatka has many productive *orange groves*. One of the largest in the State is situated here.



ST. JOHN'S RIVER, PALMETTOES.

It is on the opposite side of the river, for the river protects the trees oftentimes from frost. Mr. Cartmell and his family visited the grove, and were shown about by its proprietor, Colonel H——. As they walked among the trees the visitors asked the colonel a number of questions.

“Are orange trees difficult to raise?” Mr. Cartmell asked.

“No. They are very hardy trees, frost being their chief enemy. I generally set the young trees out in winter, twenty-five feet apart, and frequently stir the soil during the spring and summer to make the trees grow rapidly. They will begin to bear in four or five years, but they do not reach their prime till they are about twenty

years old. These trees around us are about that age, and are doing well this year. I expect to pick from five hundred trees nearly four hundred thousand oranges. Farther south the trees yield larger crops."

"When do the trees blossom?" Florence asked.

"Their regular blossoming season is in the spring, but we have them in blossom at all seasons, and sometimes you see blossoms, and green and mature fruit on the same tree at the same time. The oranges ripen from December till the first of March."

"Colonel H——, do you call this the best portion of the State for growing oranges?"

"I suppose we must yield the palm to the Indian River region. That long and narrow lagoon is so near the Gulf stream, the climate is very favorable for oranges, and even pineapples and guava."

"Do bananas grow here?"

"Come with me and I will show you. In this place protected by trees and a high fence, I set out fifteen months ago several banana suckers. They are growing pretty well; but the banana does best in the tropical belt farther south, especially on the Indian and Sebastian rivers. Sometimes the large bunches bring a dollar apiece, but they are frequently sold for fifty cents each."

A short but pleasant ride from Palatka brought our travellers to St. Augustine. The change from the bustling, active Palatka or Jacksonville to this old dead-alive Spanish town of the Middle Ages is complete and sudden. Most of the streets are narrow and crooked and paved with shells. The older houses are built of *coquina*, or shell-stone, with verandas hanging over the streets.

Mr. Cartmell called a carriage, and a short ride through



BANANA.

these quaint streets brought him and his family to the Plaza and the famous Ponce de Leon Hotel, which occupies one side of the great square.

This princely hotel, the Cartmells soon learned, unlike perhaps any other in the world, was built by a very rich man in New York, Henry M. Flagler, for the pleasure and happiness it might confer on himself and friends. He had often spent his winters in Florida, and came to like the country so well, that he wished to furnish to others a welcome retreat from the severe winters of the North. He saw that the Spanish style of architecture was best adapted to a warm climate, so he sent his architect to study the

best specimens of architecture in the great cities of Spain.

The building consequently is not a solid mass, like northern hotels, but it is grouped round a large, central court with its fountains and flowers; it has many pavilions, belfry-like towers with open arches, from which fine views are



PONCE DE LEON HOTEL, ST. AUGUSTINE.

obtained of the town, and far out to sea. The material is shell-stone, and the color a light mother-of-pearl. The building covers nearly five acres.

A thousand guests can be seated at once in the great dining hall. The grand parlor and the drawing rooms surpass everything of the kind ever found in a hotel. Then there are arcades, splendid courts, fountains, bazaars, billiard-rooms, and bowling-alleys. The carpets, curtains,

and furniture, the walls and ceilings, are all made of the best of material.

But more sumptuous than all are the splendid Roman, Turkish, and Russian baths. Besides, there is a pool, a hundred and fifty feet long, continually supplied with water from an artesian well. The water falls into the pool in a cascade.

The Cartmell children delighted to have with other children swimming frolics here in winter, while the band discoursed sweet music, and their parents and friends looked down upon them from the galleries. The whole building is lighted with electricity. It is the centre of much fashionable life. The price for board is five dollars a day or more, according to rooms. The hotel is said to have cost over two million of dollars, and its equal is not found anywhere in the world.

"To-day, children, it is comfortably cool, so we will visit the fort," Mr. Cartmell said, one morning in January.

"How delightful!" exclaimed Nellie; "shall we ride or walk?"

"We will walk, that we may the better see the many quaint old houses and buildings. I wish to point out to you the residence of the former Spanish governors, and near it the old Cathedral built one hundred years ago, and also the oldest house in this the oldest city in America."

As they walked through the streets they saw many date palms, which Miss Gray pronounced one of the most beautiful trees in the vegetable kingdom.

The boys were more pleased with the fort than with trees or any old buildings.

"Examine it carefully," said Mr. Cartmell, "for it is



DATE PALM, ST. AUGUSTINE, FLORIDA.

considered the best specimen in this country of the style of forts common in Europe three hundred years ago."

"When and by whom, Miss Gray, was this fort built?" Florence asked.

"It was built by the Spaniards, who began to work upon it in 1592. It took them over one hundred and sixty years to finish it. Most of the work upon it was done by negro slaves, Indians, and prisoners of war."

They found the fort covered about an acre of ground; the walls were in most places twelve feet thick, made of coquina stone, quarried on the opposite island.

"Papa, what are the round towers at the corners for?"

"Probably the sentinels stood there, and watched over land and sea."

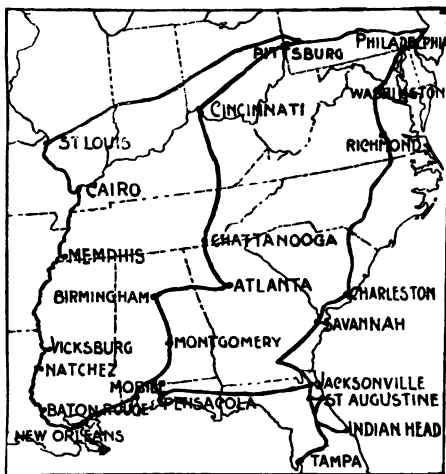
As the party were walking through the moat, Miss Gray called their attention to a part of the projecting wall, riddled with bullets. "Here," she said, "the condemned



FORT MARION, ST. AUGUSTINE.

stood up before receiving the fatal shot. The walls of this fortification could tell, if they could speak, many tales of cruelty and wrong."

Before going back to the hotel, the Cartmell family walked along the top of the sea-wall for nearly a mile till they came to the barracks occupied by the United States soldiers. The wall and the fort they found made a fashionable promenade, especially on moonlight evenings.



ROUTE OF THE CARTMELLS THROUGH THE SOUTH.

For modern warfare this structure is useless, so it is quietly crumbling into decay.

Mr. Cartmell intended to stay in Florida a week; but he stayed two months visiting the southern portion, — Indian River, Lake Worth, and Tampa, — because his family enjoyed the climate so much.

January was similar to June in New England, — warm enough to be out of doors, in summer clothing, every day. Mrs. Cartmell said she never knew before what a delight it was to *breathe*.

“Don’t they do anything in Florida except raise fruit and vegetables?”

“Yes; Key West is the headquarters of the sponge-business, exporting to Paris and New York each year five hundred thousand pounds. The sponges are usually dislodged from their beds by hooks, at the end of long poles, taken ashore and left till life is extinct; then they are cleaned and dried. The cutting of yellow pine also employs many men. The most important new business, however, is phosphate mining, which is carried on successfully

in the south, central, and western parts of the State, especially along the Peace River. These phosphates are ancient bone deposits, and valuable for making artificial manure."

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## LESSON II.

### A SOUTHERN CITY.

IN the afternoon of a pleasant day about the first of March, Mr. Cartmell and his family bid adieu to the delights of St. Augustine, and started for Jacksonville. In the latter place they went on board the train for New Orleans, taking seats in the Pullman Sleeper, and after two hours' ride all retired to rest. In the morning they were still riding through the great State of Florida. About ten o'clock they crossed the Appalachicola River, and at sunset were in Pensacola.

As Mrs. Cartmell and Miss Gray did not wish to ride another night in the sleeper, where they could not sleep, Mr. Cartmell went to a hotel for a night's rest. Early in the morning the journey was resumed toward the "Crescent City," as Mr. Cartmell called it.

"Why do you so call it, Papa?" Nellie asked.

"Because it is built on a bend of the river."

"In what State is it situated?"

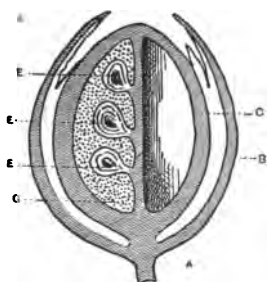
"In Louisiana."

"What States are we passing through now?"

"The Gulf States," replied Florence.

"The **Cotton States**," replied Fred.

"Both are right. You will see men at work in the fields to-day. In most cases they will be preparing the land for planting the cotton seed. It is usual to plant the cotton



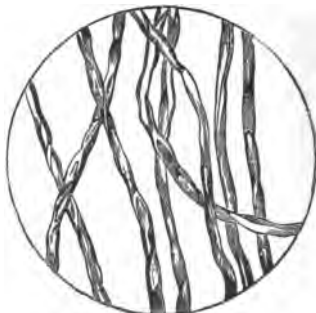
COTTON BOLL.

between now and the middle of April. The plant grows rapidly. It resembles a currant bush, and varies in height from two feet to six feet. The flower is a pale yellow when it first opens in the morning, and oftentimes a clear pink the next day. After the flower, comes the boll, or pod.

"I will draw you a cross section so you may understand better the parts. A is the stem; B is a part of the calyx; C, a part of the pistil; E, the seeds; G, the young cotton fibres. There are raised in this country two different



FIBRE OF COMMON COTTON.



FIBRE OF SEA ISLAND COTTON.

kinds of cotton. The finer and better kind—in fact, the best kind raised anywhere in the world—is the sea island, which grows near the ocean, along the islands and

shores of South Carolina, Georgia, and Florida. The fibre in this cotton is much longer than in the common kind, and it appears, when magnified, rounder and more spiral-like. The fibre of the common cotton is more like ribbons.

"There is much difference between the threads or fibres of different materials, as shown in this picture, in which E represents a fibre of fine wool; F, of coarse wool; G, of goat's hair; H, mohair; I, cowhair; and J, human hair."

"When is the cotton harvested?"

"Most of the cotton is picked in October and November. No crop, I suppose, in this country presents so



DIFFERENT THREADS.

beautiful an appearance as that of the cotton when the bolls of snowy wool are seen among the glossy dark-green leaves of the plant. The cotton is picked by hand from the open pods, and placed in baskets. One person can pick about two hundred and fifty pounds in a day. It does not all ripen at the same time."

George purchased on the train several photographs of a cotton field, one of which is given on page 20. How beautiful it would look with the natural colors!

"What is done with the cotton after it is picked?"

"It is carried to the gin-house, where it passes through the gin, a machine invented by Eli Whitney, of Connecticut, to separate the seeds from the cotton fibre. This machine is generally turned by horse-power. The next process is that of packing the cotton into bales. This is

done by presses, sometimes turned by hand or horse-power, more frequently by steam-power."

"How large is a bale of cotton?"

"Its average weight is four hundred and fifty pounds."



COTTON FIELD.

"What States grow the most cotton?"

"For a long time Mississippi was the leading cotton State, but for several years Texas has grown as much cotton as Mississippi and Louisiana together. According to recent statistics, furnished by the government, the great cotton States named in order are Texas, Mississippi, Georgia, Alabama, Arkansas, and Louisiana."

While Mr. Cartmell was explaining to the children about the raising of cotton, they saw from the car windows

men at work in the cotton fields ploughing, and, in some cases, planting the cotton seed.

After leaving Mobile the route lay for much of the way very near the Gulf. They passed many steam saw-mills beside the track, and ran through miles of the yellow pine, which here grows tall, straight, and tapering as a fishing rod.

In some places the railroad crosses long and narrow islands; in other places it passes over many bays, lagoons, and wide mouths of rivers. At Bay St. Louis the train crossed over two miles of deep water on a strong trestle. George and Fred were constantly at the car windows. They frequently saw ducks fly up as the train approached. At almost every stopping-place boys were starting out in canoes to go duck-shooting. After crossing the Pearl River the ducks became so numerous that the passengers fired upon them from the car windows.

Now they constantly obtained glimpses of the long, narrow bays, or, as they call them in this part of the world, "bayous," fringed with beautiful trees. As they approached New Orleans, they caught a glimpse of Lake Pontchartrain and the large live-oaks growing on its edge. About five o'clock in the afternoon they entered the city, and riding by the great markets and warehouses, their train came to a stop in the station near the business part of the city.

The next morning the Cartmell family started from the St. Charles Hotel on a tour of the city. They rode through Canal Street, which they found to be about two hundred feet wide. This was one of the principal business streets, and contained numerous fine stores and some fine private residences. St. Charles, Elysian-fields, and Espla-

nade streets were also very wide, with double rows of trees in the centre. In many of these wide streets the horse-cars run between the trees, and thus avoid spoiling by their tracks the roadbed for carriages. Mr. Cartmell drove out

a long distance on the famous Shell Road, which is straight as an



BAYOU.

arrow, hard as flint, and smooth as polished marble.

Here they met

some of the rich people driving fine horses at a high rate of speed.

"Are not the streets regular in this city, Father?" George asked.

"Yes, most of them run parallel to the river for about twelve miles; the cross-streets run out perpendicular to the river toward the lake six miles away. You notice as we ride along that the city has the open drainage system. The gutters receive the liquid wastes from the houses, and in summer must become very foul. Some portions of the city are only one foot above the level of the sea, and much of the area is below the spring level of the water in the river, so the drainage is a serious matter."



LAKE PONTCHARTRAIN.

"How do they keep the river out of the streets, then?" Nellie inquired.

"To prevent the river overflowing its banks every spring, and flooding many of the finest streets, there have been constructed high and broad embankments, called levees, extending along the city front, and for two hundred miles or more above the city and fifty miles below. A similar levee for the same purpose has been built along the shore of Lake Pontchartrain. The river levees we will examine in a day or two. The extending and keeping in repair of these dykes is so important that the expense is shared between the State and the nation."

In their various rides about the city, during a visit of over a week, the party saw much to admire. Fred liked best the equestrian statue of Jackson, and the buildings surrounding the square; George admired the Custom House and Post Office on Canal Street, built of Quincy granite; Miss Gray enjoyed best the French quarter. These people seemed to have happy pleasant homes, and to enjoy simple amusements, and to be always getting a good deal of joy out of life. The French markets were especially attractive. The streets in this part of the city bear such French names as St. Claude, Chartres, Bourbon, Burgundy, and Orleans.

Mr. Cartmell enjoyed very much such business centres as the Cotton Exchange and the Sugar Exchange.

Mrs. Cartmell was deeply interested in the cemeteries with their fine magnolia and cypress trees. She was interested in learning that owing to the nature of the soil, bodies are buried in tombs above the ground. Florence spent her time in learning all she could about the creoles,

while Nellie remembered their visit to the United States mint, and the strong machines for stamping the coins which she saw in operation.

All the party never tired of visiting the levees and seeing the river steamers loading or unloading their cargoes. These steamers are especially adapted to the work required of them. They stand well out of the water, are light of



STEAMERS AT THE LEVEES.

draught, easily loaded and unloaded, rapid in movement, and furnished like the Long Island Sound steamers in elegant luxury.

The levees in the city are the wharves. Here are the greatest bustle and life. Lines of freight cars stand on the city side near the warehouses, and steamers are constantly coming in and unloading, or raising the great gangplanks and starting up the river. One of the most picturesque scenes is where the cotton is unloaded from the

river steamers, and shipped on ocean steamers to Europe or other ports.

While the Cartmell party looked at the busy scene from their carriage, Fred asked his father if New Orleans was the largest cotton mart in the world.

"Yes, my son, it is. The South now raises over seven million bales a year, and this city handles more than one-



LOADING AND UNLOADING COTTON AT A LEVEE.

fourth of it all, and yet cotton does not grow abundantly near the city. This enormous amount of cotton comes here from the Red River, the Ouachita River, the Mississippi River, and by various railroads."

"What do the people here do with it all?"

"They send about one million bales to England, a large amount to France and Germany, and some to Italy, Russia, and Spain."

They soon came to another part of the levee, where

business was lively. Here they found sugar-sheds, and under them the raw sugar stored in barrels and hogs-heads. While riding back to the hotel, George obtained



SUGAR LANDING.

two excellent photographs of the **sugar** business. Mr. Cartmell, in looking at them, said: "Sugar is found in a great variety of plants, but it is obtained practically from a very few sources. In Vermont we found the source was the rock-maple; in France and Germany it is the beet; in most tropical countries it is the sugar cane. This plant resembles corn. As it does not produce any seed, it is raised from cuttings. These cuttings, two feet in length, are set out, in the winter months, after the ground is ploughed. In August or October the canes

have grown, and are stripped of their leaves, the top part is cut off, and the stem, or cane, cut near the ground and bound into bundles. These bundles are loaded on carts and carried to the mill.



CUTTING THE SUGAR CANE.

“ The canes are ground or crushed between iron rollers in the mill, and the juice, as it is pressed out, is collected in a large tank. From this tank the juice runs into large open pans, in which it is boiled down, and the impurities that arise are skimmed off. The process of boiling down still further is carried on usually in covered pans, or vacuum-pans, at low temperatures. When the liquid in this way becomes the right thickness, it is drawn from the vacuum-pan into conical earthen pots. A part of it crystallizes, or becomes sugar, and a part runs off as molasses. The latter is the part which will not turn to

sugar. The molasses is frequently separated from the sugar by machinery."

A few days later the children witnessed the greatest carnival in the country, which is usually known by the name of *Mardi Gras*. The grand procession takes place



LOADING THE CANE.

on Shrove Tuesday, when hundreds of people, dressed to look like animals, goblins, and all kinds of strange creatures, march through the streets with music and torches. They set off fireworks as they go along. There was a masquerade ball in the evening, which the older folks attended.

The Cartmells remained in New Orleans several weeks. They found the climate moist and genial. The temperature never fell below the freezing point during their visit, and many times the sun was very warm in the middle of the day. Twice there were terrible thunder-showers, which washed the streets and made them clean and sweet for a while. They learned that snow was a great rarity. They met and became acquainted with a number of families in

the city, and found them very polite and hospitable, highly cultured, and good talkers. The people of New Orleans take great pride in the city and State, in its schools and public institutions.

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### NEGRO SONGS.

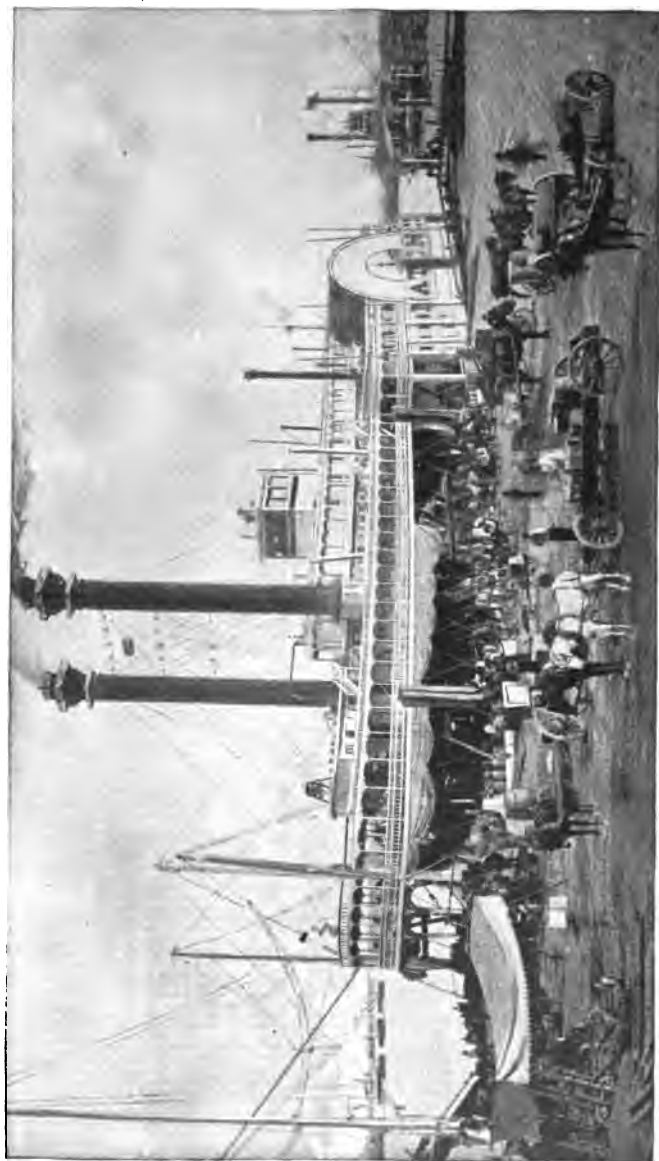
#### THE BOATMAN'S SONG.

WE pray de Lord ; he gib us signs  
Dat some day we be free ;  
De norf-wind tell it to de pines,  
De wild-duck to de sea ;  
We tink it when de church-bell ring,  
We dream it in de dream ;  
De rice-bird mean it when he sing,  
De eagle when he scream.  
De yarn will grow, de cotton blow,  
We 'll hab de rice an' corn ;  
O nebber you fear, if nebber you hear  
De driver blow his horn !

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#### THE COTTON-PICKING SONG.

OH, de cotton fields am white, and de pickers is but few,  
Save me, Lord, from sinkin' down ;  
If your fingers is n't nimble, sure you nebber will git troo,  
Save me, Lord, from sinkin' down ;  
If your bags is very light, den de overseer's lash,  
Save me, Lord, from sinkin' down ;  
If you 're laffin' in de mornin', den at night your teef will gnash,  
Save me, Lord, from sinkin' down.



THE NATCHEZ.

## LESSON III.

### UP THE MISSISSIPPI RIVER.

As Mrs. Cartmell and Miss Gray were anxious to see something of **river life** and travel, Mr. Cartmell engaged passage for them and the girls on one of the steamers, belonging to the Anchor Line, called the "Natchez." The boys and their father preferred the land route.

The steamer "Natchez" proved to be a fine boat. The table was well supplied with a good variety of food, well cooked and well served. The large staterooms on deck were very convenient for families, and afforded excellent chances for observation. The "grand saloon" was the pride of the boat. It boasted of a bright colored carpet, a number of large easy-chairs, and a piano which badly needed tuning. The staterooms leading from the saloon were occupied by business men and those who cared little for the scenery.

The steamer left New Orleans, Saturday, at five o'clock in the afternoon. For the first few miles above New Orleans the great river was not difficult to navigate, as its course is tolerably straight. Miss Gray entertained the children by reading portions of "Evangeline," especially the part referring to this section of the country.

"In the morning," said Miss Gray, "we shall pass that part of the river, a few miles below Baton Rouge, where



THE GRAND SALOON.

the poet says Evangeline and her guide were going, in the lines I have just read: —

“They were approaching the region where reigns perpetual summer,  
Where through the Golden Coast, and groves of orange and citron,  
Sweeps with majestic curve the river away to the eastward.”

As they approached Baton Rouge, the capital of Louisiana, they began to realize that the deviating character of the river had not been exaggerated. The levees, or banks of earth, were here about eight feet high. Behind them, as the water was high in the river, they could see extensive sugar plantations and splendid villas.

Baton Rouge, they noticed, stood on the first bluff of any importance, about forty feet above the river. Con-

siderable of the town can be seen from the steamer. The next point of interest was the beautiful White Cliffs, on which is situated Port Hudson, a small town noted for cotton shipments.



RIVER STEAMERS AT THE WHARF.

Three hundred miles above New Orleans the bluffs are much higher. The steamer reached the wharf at Natchez in the evening. The business part of this town is "under the hill," near the river; the upper town is elevated on the summit of the bluffs, three hundred feet above.

"What is Natchez noted for, Captain?" inquired Florence.

"It is a great cotton town. Early in the cotton season some of the streets are sometimes impassable on account of the many cotton bales. If you should go up on the cliff to-day you would see a beautiful quiet town, fine public buildings, and hosts of pretty houses."

Vicksburg is another town beautifully situated on bluffs still higher above the river than Natchez. The

houses were seen rising, terrace above terrace, on the sides of the hills, the Court House being the highest. The view of the place is quite picturesque.

For the first hundred miles above Vicksburg Mrs. Cartmell and the girls saw cotton plantations on each side of the river. During the rest of the day they saw vast and gloomy stretches of forest and flat, of swamp and inlet, of broad current and green islands.



A PLANTATION HOUSE.

Mrs. Cartmell spent much of her time in the observatory on the upper deck, from which she could see delightful views of the fields and plantations near the river. Many of these houses were very attractive, and appeared to belong to people in prosperous circumstances.

One day a courteous Southern gentleman, by the name of Nixon, who had often travelled between New Orleans and St. Louis, introduced himself to Mrs. Cartmell, and gave her much information about the great river and the people living along its banks,

"Are the plantations we see along the river prosperous?" inquired Mrs. Cartmell.

"They are fairly so," replied Mr. Nixon. "Cotton is still the principal crop raised in this valley. It is quite an uncertain crop. The weather, the worms, the overflow of the river, are its constant enemies; if the crop escapes all these, and there is an abundant harvest, then the price may be so low that the profits are small."

"How does the planter carry on his business?"

"In some cases the plantations are worked on shares, the planter taking out the expenses of the crop, and, when it is sold, dividing the net profits with the negroes; in a few cases the land is rented to the workers; in most cases the men are paid wages, which range from fifteen to thirty dollars a month. The planter generally has a store, and receives back the money for goods."

"Can you not tell me something about the Mississippi River?"

"I have studied this river for years, because I formerly owned a large plantation on its banks. It seems to me that the chief business of a great river is to wear away its banks in its upper course, and deposit the sediment, or mud, in its lower course. No river in the world is more faithful in this work than the mighty Mississippi. All the soil between the bluffs of this river is *alluvial*; that is, it has been brought down by the force of the water, and deposited in this valley, thus making it the richest portion of the earth for vegetable and plant growth.

"I have learned in watching this river from year to year that water holds in its grasp particles of earth in proportion to the swiftness of its current; the faster it flows the more earth in solution it will carry. On the other hand,

the slower the water moves, the more readily it deposits *silt*, or mud; and this explains why a bar is generally formed whenever a snag is lodged in a stream of muddy water.

"Most of the coarser particles of the Mississippi are dropped by the river before it reaches St. Louis. The distance from St. Louis to the Gulf is thirteen hundred miles, and the fall of the river is only three hundred and seventy-five feet, or an average of three inches to a mile. This makes a very slow current, especially at the time of low water, and so the amount of matter deposited is then very large, and the river increases its loops; but at the present time, and usually in the spring, the river is very high, and flows much faster, deposits less matter, and in many cases cuts through the neck of the loop, and thus shortens its course."

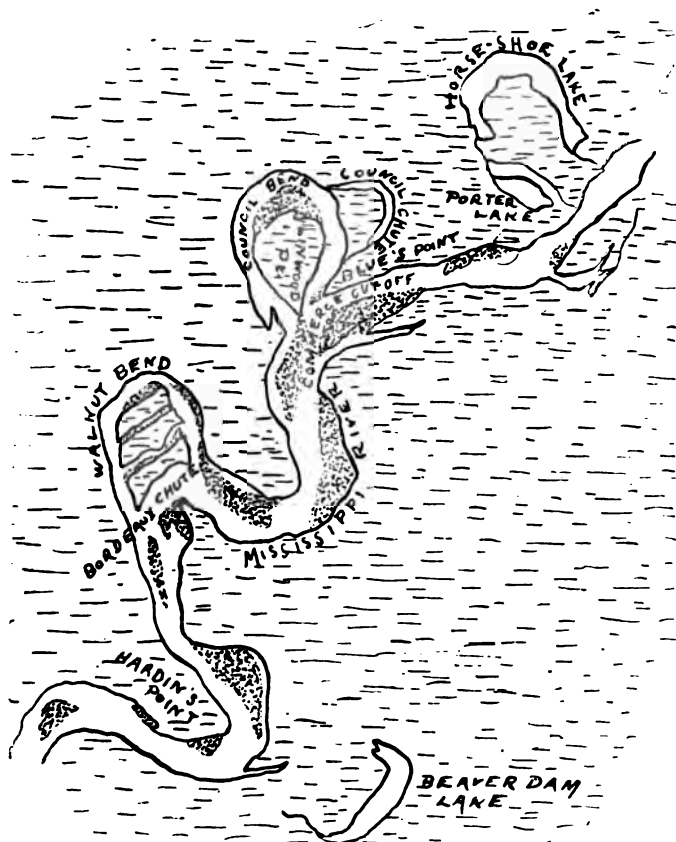
"I am much interested in your views, Mr. Nixon," said Mrs. Cartmell. "Please explain to me these tedious ox-bows."

"The ox-bows, madam, are a slow growth formed by the action of the current of the river during many years. We are now passing through some of these noted bends, here below Memphis. I will get the chart of the river from the pilot's house, and explain the changes."

"Thank you very much for your kindness."

"We are now passing through the small bend near which the words 'Porter Lake' are printed on this chart. This is stage number one. The depth of the water is much greater on the concave side of the river, showing that the river is cutting away the plain on that side. The *silt* taken from the concave bank of the river is laid down on or near the convex bank of the next bend farther down

stream. Thus the current is constantly increasing the curve. By and by it becomes as marked as it is at the



BENDS IN THE MISSISSIPPI RIVER.

bend where 'Mississippi River' is printed. This is called the 'strong-bend' stage of the ox-bow. Hardin's Point

represents the third stage, called the 'close-bend' stage; Walnut Bend shows the 'cut-off' stage. At first only a small amount of water passes through the 'chute;' as this increases, the main current takes the shorter way, as it has at Council Bend, where our steamer passed through Commerce Cut-Off, and thus saved more than ten miles in our trip. This is called the 'lagoon' stage of the ox-bow. The river is changing the lagoon at Council Bend into a lake, as it has already done eight miles above at Porter and Horse-Shoe lakes. This is a good illustration of the last, or 'lake,' stage of the ox-bow."

"I must explain this to the girls when they come in," said Mrs. Cartmell. "Do the planters have much fear of inundations?"

"It is the one fear which never leaves them. It is no easy matter to remedy the trouble. During ordinary stages the lower river has an average width of less than one mile; at times of flood, it is sometimes fifty miles wide. The great problem for the people along the lower Mississippi to solve is how to control a river which at one season is an ordinary stream, and at another an ocean."

"Have you not done so by building levees?"

"We have tried to, but not with the best of success. These levees are built of the soil brought down by the river. This soil is not much heavier than the water; and hence it is quickly picked up by the current, and carried away. The river flowing through these artificial channels is constantly depositing material which raises its bed; and when the spring rise comes there is enough increased force to break through the embankment, and overflow the land."

"What do you propose as a remedy, then?"

"The greatest safeguard against such accidents is to be found in maintaining a uniform current, — in other words, in preventing such a dangerous rise in the river as we now see; and that can be done by the United States government building great storage basins near the head-waters of the Mississippi, Missouri, and Ohio rivers, and keeping back the water in the time of floods and melting snow, and releasing it in the time of drought. A few such reservoirs have already been built in the States of Wisconsin and Minnesota, but many more are needed."

Soon after this conversation they approached Memphis, which presented quite an imposing appearance from the upper deck. Many of the buildings in the town stand on the bluff far above the levee at its foot. This town, about the size of Troy, New York, is a great cotton mart.

They noticed a great many islands in the river; they were of all sizes, shapes, and appearances. From the mouth of the Ohio they are numbered; but the mighty current of the river frequently washes away an island, and causes others "to grow," in the language of the river, in other places.

"Mr. Pilot," said Miss Gray, one morning, "how do you ever keep in mind the frequent changes in the channel of this wonderful river?"

"We help one another. We have an association with headquarters at St. Louis. I notice on each trip important changes, and report them, and the other pilots do the same. Then we are constantly studying the character of the river, and finally learn its habits."

The negroes on the steamer employed in carrying freight from the steamer to the wharves at the different landings are called "roustabouts," and they afforded our friends

very much amusement. They usually sing at their work some melody to words which have little meaning, as, —

“O, starboard side,  
Oo-le-oo-le-oo!  
Nudder one down thar!”

As they journeyed northward they frequently met steamers *towing* barges of coal down the river. Miss Gray asked the captain where these came from and where they were going.

“That coal, Miss Gray, has probably come down the Ohio River from Pittsburg, and is on its way to New Orleans and other cities below us. You probably notice that the barges are pushed ahead of the steamer, and not pulled behind it, as towing is generally done in the North. “These pushing steamers are very powerful; they are noted for strength rather than speed; some of them will push twenty thousands tons of coal at the rate of nine miles an hour.”

“What does it cost to carry coal so far, Captain?”

“To carry a ton of coal by water two thousand miles, from Pennsylvania to Louisiana, costs only \$1.30. The coal is worth in Pittsburg \$2 a ton; it is worth in the Crescent City \$6, which leaves a good margin of profit.”

Mrs. Cartmell and her friends saw the next day quite a different appearing craft towed, that is, pushed ahead of a powerful end-wheel steamer. These barges stood out of the water more than the coal barges, and seemed to be more easily guided.

“What are those barges, Captain?” Florence inquired.

“Those are grain barges from St. Louis, belonging to the Mississippi Transportation Company. They carry grain from St. Louis to New Orleans. Each barge holds

about fifty thousand bushels of wheat or corn, and draws when loaded ten feet of water. One tug, or steamer, can tow seven barges, and make the trip in seven or eight days. It would take sixteen trains of forty cars each to carry as much grain by railroad, and cost five times as much for freight."

Not far above Memphis, they noticed the fourth day of their journey a decided rise in the river. It was evident that the spring rains had been unusually heavy, and the river was now greatly affected by them, stretching away on either side farther than the eye could reach. Crevasses were now and then seen; the great height of water drove the inhabitants into the second story, and caused the cattle to huddle together on some high knoll.

"Look, Florence!" exclaimed Miss Gray, "see how that poor negro's wood-pile is being carried down the stream!"

GRAIN BARGES FROM ST. LOUIS.



In a few moments after this remark they all saw the same man's cabin sailing along at considerable speed, with the owner calmly sitting upon the roof, smoking and patiently waiting for a "fall" in the river. In many places the river was making land on one side and tearing it away on the other side.

When the river is so high the steamers pass over a very different and much shorter route than when it is very low. In one place the river seemed to have fallen somewhat, but the muddy waters had covered the fields with slime, and broken down the trees and fences.

About noon on Thursday, the "Natchez" steamed into sight of Cairo, which stands on low land at the mouth of the Ohio River. Before the expensive levee on the water side was built the place was retarded in its growth by the frequent inundations. The present high water had apparently done very little damage, and business was flourishing.

"How much farther is it to St. Louis, Captain?" Nellie inquired.

"Just one hundred and eighty miles, my little girl, and we are due there to-morrow at six o'clock P. M."

## LESSON IV.

### ST. LOUIS.—CHATTANOOGA.

THE nearness of the great city of St. Louis was made apparent by the amount of smoke from the numerous manufacturing centres and the increased number of river steamers collected there. The river at this place is not more than two thousand feet wide, but is probably about one hundred feet deep. The city stretches along the river for over three miles. The levees are paved with limestone blocks, and the banks slope down to the river, showing the white stones except at high water. Barges and floating docks were moored near the edge of the water, and the river steamers anchored beside them, and goods were landed from the steamers by being carried across the floating docks and over movable plank-walks to the stone-paved levee.

“St. Louis,” said Miss Gray, “is situated in some respects like Chicago. Both are great railroad centres; both have a growing fresh water commerce. St. Louis has twenty-one railroads centring there, and it is the focus of eighteen thousand miles of river navigation. Fifteen million bushels of grain have been moved in a year by the river to the Crescent City, to be re-shipped in ocean steamers to Europe. Vast coal-fields in Missouri and Illinois are very near St. Louis; great forests of pine are not far away;

and deposits of lead, iron, and zinc sufficient to supply the world are within short distances."

Mrs. Cartmell, Miss Gray, and the girls while thus conversing reached the levee, where they obtained a carriage



A PART OF THE LEVEE, ST. LOUIS.

and rode to the Southern Hotel, feeling delighted to be once more in a firm building.

The next day the ladies indulged in a little shopping on Washington Avenue, one of the principal streets, and Broadway, another important thoroughfare. They found excellent stores in this southwestern city, and good clean sidewalks.

"Mamma," said Nellie, "I want to see the river once more."

"Well, we will go along this street. It must lead toward the river."



WASHINGTON AVENUE, ST. LOUIS.

They did so, and were quite astounded to find that they had walked upon the bridge before they were aware of the fact, — and that, too, without descending at all; and they were some eighty feet above the water. From the top of the bridge a fine view was obtained of the traffic on the river; of the busy scenes along the levees, or wharves, where several steamers were loading or unloading; of the hundreds of foot passengers hurrying by; of the numerous wheeled vehicles and electric cars above; and, a story below, of the never ending line of steam cars passing east and west through the centre of the iron structure.

“Who made this wonderful bridge?” Florence inquired.

"Capt. James B. Eads," her teacher replied. "Have you heard of him before?"

"Yes, he built the jetties at the mouth of this river."

"Before he built the jetties he completed this bridge. The foundations had to be sunk to bed-rock, two hundred



ST. LOUIS IRON BRIDGE OVER THE MISSISSIPPI RIVER.

feet below the surface of the water, and made firm enough to resist the strong current of this rapid river. When you look at the bridge from one side you will notice the beautiful arches which support the tracks above. Each span consists of eight slender steel tubes arranged in pairs, and connected by ties and diagonals. It is said that this bridge cost about twenty million dollars."

"I suppose this is the only bridge across this mighty stream."

"No. Three miles up the river is the new Merchants' Bridge, also of steel."

In the afternoon the ladies took a long drive through several fine avenues, visiting Lafayette Park and Tower Grove Park. In the latter they saw several fine bronze statues of such men as Columbus, Shakspeare, and Humboldt. They passed many fine residences in the afternoon drive, and learned how the city was built on three terraces, rising from the river one above the other.



A RESIDENCE, ST. LOUIS.

Two days later Mrs. Cartmell and the children with Miss Gray started for Pittsburg.

We must go back now and see what the rest of our party have been doing. A few days after Mrs. Cartmell left New Orleans, as related in the last chapter, Mr. Cartmell and the boys started northward by the Louisville and Nashville railroad. In the southern part of Alabama they rode through forests of long-leaved pine, oaks, and black cypress. Much of this timber is cut and sent to New Orleans. The great product of the State they found to be cotton, for which the fertile soil and the climate are well adapted. They made their first stop at Montgomery, the capital of this State.

The next morning father and sons rode about the town, which is prettily situated on the Alabama River. In this ride they saw fine churches, elegant business blocks, and a handsome court house. From the Capitol, crowning a fine elevation, a good view of the town and the undulating country was obtained.

"How large is Montgomery, Father?"

"I think about the size of Malden, in Massachusetts."

About noon Mr. Cartmell proceeded to Birmingham, which is now the largest as it is the youngest city in the State. "A little over twenty years ago," said Mr. Cartmell, "this town did not exist. In eighteen months from the date of building the first house there was a population of nearly four thousand. The increase in population from 1880 to 1890 was marvellous, being 750 per cent. Only six other towns in the country grew more rapidly."

"What made it grow so fast?"

"Because it is centrally located in a rich mining country. Both coal and iron are found here near the surface. Red Mountain has a supply of iron ore sufficient to last for centuries. Several English firms have invested in the mines and in iron furnaces."

The next day Mr. Cartmell went eastward into Georgia so as to visit Atlanta, another wonderfully growing city, which is now as large as Cambridge, near Boston.

Here they found a new and wide-awake city with many cotton mills and much of Yankee enterprise. It seemed to be a great railroad centre, and boasted of a very even and delightful climate.

Before leaving Atlanta, Mr. Cartmell and the boys had long letters from the ladies, telling of their progress up the Mississippi River. These letters were mailed from Cairo.

Leaving the Yankee city of the South, Mr. Cartmell proceeded northward to Chattanooga. They found this place to be situated in a deep valley of the Tennessee River, surrounded by high hills and picturesque scenery. Steamboats can navigate the river above and below. As a dozen railroads centre there, the place has become commercially of considerable importance. From some of



CHATTANOOGA.

the business men in the place they learned that on all sides of Chattanooga lie inexhaustible supplies of coal and iron, timber, marble, limestone, and granite. The Tennessee valley, they learned, is also a rich agricultural region. The people seemed full of enterprise and progress, and to be living in accordance with their chosen motto, — “Push things.”

“Papa, what elevation is that towards the south?” Fred asked, the second day of their stay in Chattanooga.

"That is *Lookout Mountain*, and to the left is the lower part, known as *Missionary Ridge*. Have you ever heard of these places before?"

"Why, yes. It was on Lookout Mountain that the 'Battle above the clouds' was fought under Grant, and Missionary Ridge was taken by Sherman the next day."

"We will go up there before we leave."

They did so, and found still left some reminders of the terrible battles; the magnificent view from the highest peak, sixteen hundred feet above the Tennessee, rewarded them fully for their visit. George made a sketch of the town, river, valley, and hills, similar to the picture which is given on page 49.

On the following day Mr. Cartmell passed in the forenoon up the beautiful East Tennessee valley, and then on to Cincinnati and Pittsburgh.

## LESSON V.

### IRON FURNACES.

"WHAT do you wish to see to-morrow, George?" asked Mr. Cartmell.

"I would like to see how **iron** is made."

"What do you wish to see, Fred?"

"I want to see the oil fields."

"The iron-mills are near us in the city, so I think we will visit them first. So much iron is found in this part of Pennsylvania, and is here produced in such quantities, that this city is often called the 'Iron City.' Is iron found in other places?"

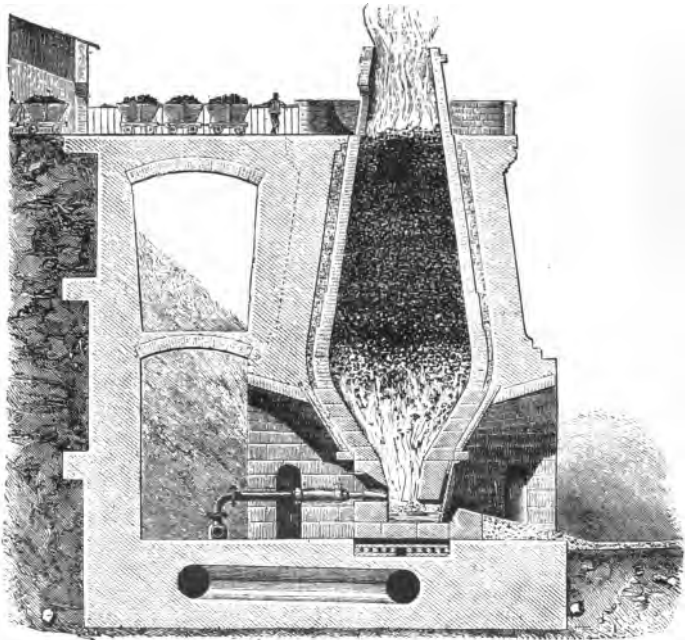
"It is found," George replied, "in several of the southern and western States. I think the Lake Superior mines, in Michigan and Wisconsin, are the richest in the country. There are also valuable mines in Canada."

"Iron is combined with many other substances in the earth, and in this form it is called *iron ore*. The iron in the ore is usually separated from the impurities by great heat in a blast-furnace.

"The blast-furnaces in which this is done look like chimneys from forty to one hundred feet in height. At the base these furnaces are square, and have openings on each side, so that the melted iron and slag may be drawn off, and the blast admitted."

“What do you mean by the blast?”

“The current of air that is furnished to make the fire burn more freely. We do just the same thing when we use the bellows to make the fire on the hearth blaze more brightly.”



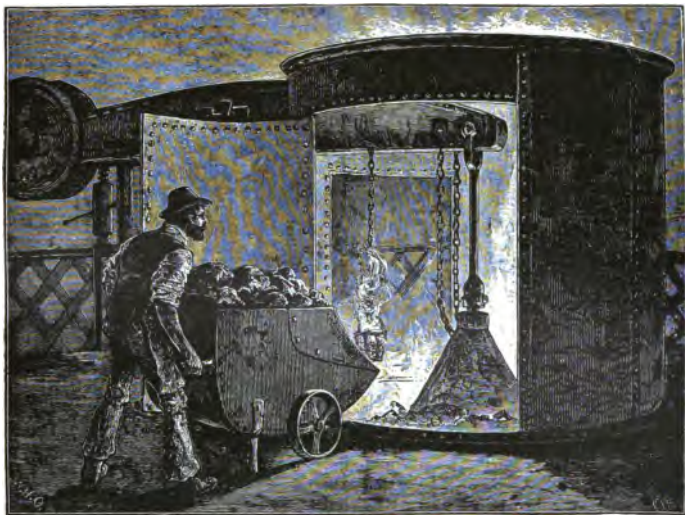
A BLAST FURNACE.

“Do they use bellows in these furnaces?” asked Fred.

“There are great blowing-engines which force the air into reservoirs, and from these it is carried to the furnace by means of pipes. This air is heated before it comes here, so that it does n’t cool either the ore or the coal.”

"Does each furnace have its own blowing-engine, or can several of them be supplied with air by the same engine?"

"Sometimes as many as a dozen furnaces are built together, and the same engine supplies them all with air."



CHARGING THE FURNACE.

The next day Mr. Cartmell, Miss Gray, and the children visited some of the noted iron-works in Pittsburg, and studied the process of making iron and steel.

At the first iron-mill they saw a man charge a furnace. He opened a door near the top of the furnace and dumped in a wheelbarrowful of coal; then he put in iron ore; then some limestone, so as to make layers of each kind. As soon as the right amount of matter had been thrown

in, the workman closed the door, and looked toward the children, and said a pleasant word to Nellie and Florence.

"If you are trying to purify the iron, why do you put limestone with it?" asked Florence.

"Iron melts more quickly when the limestone is used. Then, too, it carries off some impurities with it. On account of its weight the iron sinks to the bottom of the furnace, and then is drawn off."

"Does it take long to melt?" inquired Miss Gray.

"It is generally drawn off twice a day, — in the morning and again at night. They will draw off about four o'clock this afternoon."

Mr. Cartmell and the others came back to the building at the appointed time to see the furnace tapped. As soon as the opening was made, the melted iron ran out, looking like liquid fire, shooting forth in all directions showers of sparks, and driving the girls and Miss Gray back to a safe distance. The heat was intense.

The melted iron ran down the large trench, and into the side-trenches where not stopped by the workmen, and from the side-trenches into the short openings in the sand. It soon cooled and hardened. Then the men broke the short pieces, or "pigs," from the longer ones, which are called by them "sows;" hence this form of iron is called "pig-iron," or cast iron. In this form it is sent from Pittsburg to many other places, and used for stoves, and ten thousand other useful things that can be made by simply melting and recasting.

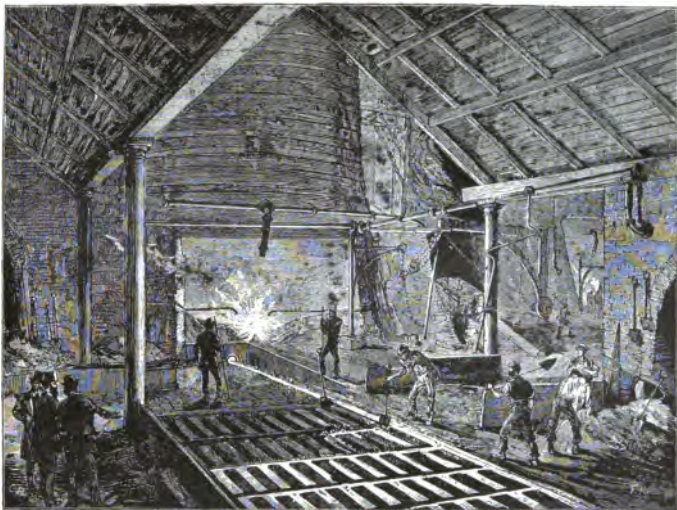
"You have all seen," said Miss Gray, "many beautiful and sometimes delicate things that are made out of iron by recasting, as they made the scales in Vermont. You remember, too, how brittle such things are, and how often they are broken."

"Why, I thought iron was very strong, and would not break easily," said Nellie.

"It is strong, but in this condition it is very brittle."

"Is there any way of making it tough, so that it will not break?" inquired Florence.

"Yes," said her father; "'wrought' iron, as we call it, is made by melting cast iron, and subjecting it to different



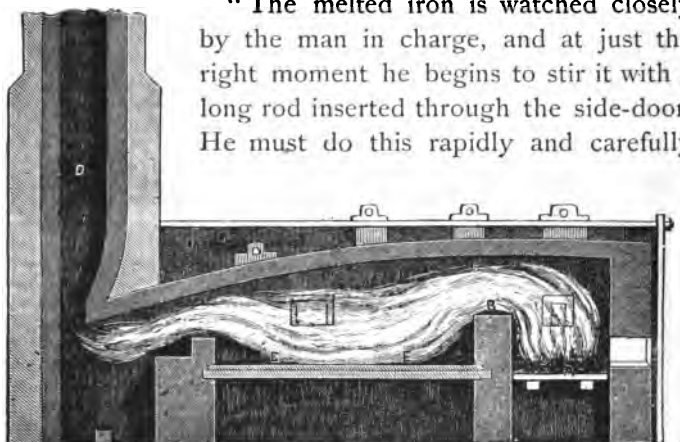
MAKING PIG IRON.

processes that render it capable of being rolled out. We will now visit a rolling-mill, where this is done, and see a puddling-furnace, in which the 'pigs' are melted."

The superintendent of the rolling-mill explained the puddling-furnace as follows: —

"This furnace is made so that the flames are bent down upon the iron at E by the bridge B. The waste gases

escape up the tall chimney D, at the top of which there is a damper, under the control of the workman, enabling him to regulate the heat at will.



SECTION OF A PUDDLING-FURNACE.

until he has formed a white-hot ball about a foot in diameter, which he removes from the furnace."

"I should think such work would be dreadfully hard," said Fred.

"Yes," answered the superintendent, "it is so exhausting that a man can perform it for only a few years. In addition to the great amount of strength that he must use, practice is necessary, in order that the heat may be carefully regulated, as either too much or too little must be avoided."

"What do the workmen do with the white-hot ball?" Florence asked.

"It is kneaded and pounded by a steam hammer, and then rolled and cut into bars. By this time it has cooled,

and must be reheated; so it is placed in another furnace until it is in a condition to be welded together in a mass, after which it is hammered or rolled into plates, bars, or whatever shape may be required.

"Come with me, and I will now show you the different processes."

The superintendent then took them to a large room in the rolling-mill, where several strong men were working the balls of iron. They saw a ball taken out of the furnace and placed under the great steam-hammer, and kneaded like so much dough. While they were doing this, the sparks flew in all directions, covering the men; but they didn't seem to mind them at all. After thanking the superintendent for his kindness, they returned to the hotel.

At the dinner-table the children told their mother about the morning visit to the foundry and rolling-mill.

"We have not finished the subject," said Mr. Cartmell. "I propose to go this afternoon to see larger and better mills, where they make a better kind of iron."

"You mean *steel*, I guess," said George.

"You are right," said his father.

Mrs. Cartmell joined the party to please the children. As they rode toward the steel-works Mr. Cartmell said that the new way of making steel differs very much from the old way. The old way was to place iron and charcoal in layers, and then burn the charcoal. This method was slow, but it produced fine steel.

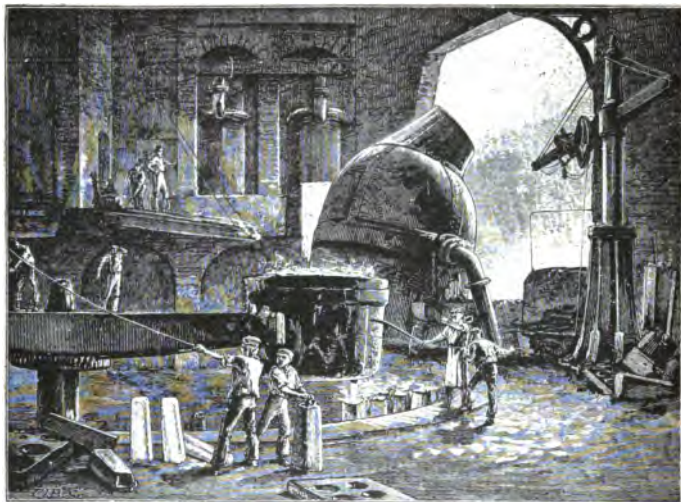
As they were getting out of the carriage at the mill George noticed the name of the company, "The Bessemer Steel Works."

"Is this Mr. Bessemer's mill?" George asked.

"No. It means the process used here for making steel

is the one invented by Mr. Bessemer, of England, a man who has made as many inventions as Mr. Edison."

They were first taken into a large room containing an immense vessel called a "converter," which holds several tons of molten iron, and is hung on trunnions in such a



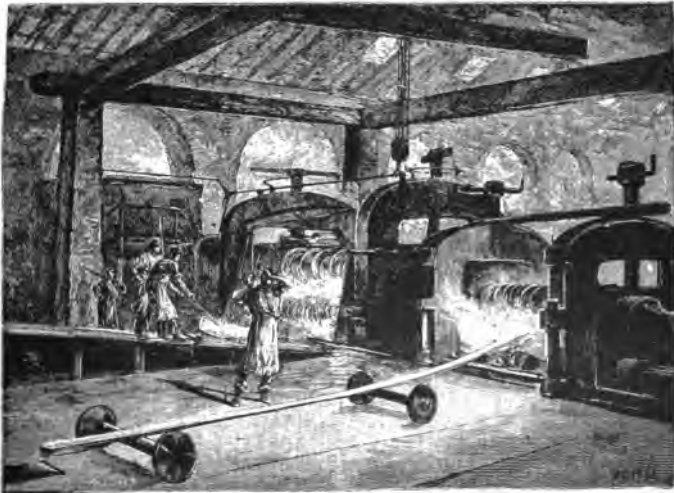
BESSEMER CONVERTER.

manner that it can be very easily moved to and fro. As soon as one of the men saw the party, he kindly offered to explain how they made steel.

"We have just put into the converter ten tons of melted cast iron. Now the workmen will turn on the blast. Notice the effect."

The great converter began to tremble as the air rushed through the iron, and being heated and expanded, caused awful bubbling and boiling; the inflammable gases caught

fire and blazed furiously, making for a few moments a roaring flame, whose heat and light were almost unbearable. At last the flames changed in color, and died down; the sparks became fewer and smaller till only little dots of light remained. At a given signal some more melted cast



ROLLING STEEL RAILS.

iron was poured into the converter, and the process was completed; only fifteen minutes had been spent in changing ten tons of iron into steel, where two or three weeks used to be required by the old way.

"If it can be made so quickly now, I should think it would be used more than it used to be," said Florence.

"It is, Florence. Perhaps the greatest change was in the introduction of steel rails instead of iron ones."

"Why was that important? I should n't think it would

make any difference whether rails were one kind or the other."

"Indeed, it makes a great difference! The steel wears longer, and can bear the carrying of loads that would have crushed the old iron rails."

The Cartmells next visited a part of the establishment where steel rails were rolled out from the steel made in the converter. The labor here is very heavy, and the men seemed to work with all their strength.

"There has been such a demand for steel rails in this country during the last five years," said Mr. Cartmell, "that this work has been carried on in most mills day and night. The steam and electric railroads have made great demands upon the furnaces. Much money has been made in this city in this business, and one part of the city is noted as the part where the 'iron kings reside.'"

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### PITTSBURG.

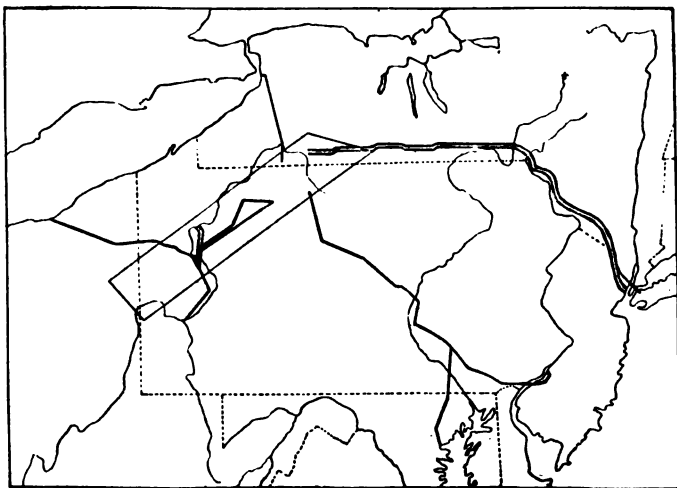
"Here lay dark Pittsburg, from whose site there broke  
The manufacturer's black and sparkling smoke,  
Where Industry and useful Science reigned,  
And man by labor all his wants sustained :  
There, mid the howling forest dark and drear,  
Roved the wild Indian, wilder than the deer,  
King of the woods, who other blessings prized,  
And arts and industry alike despised :  
Hunting the trade, and war the sport he loved,  
Free as the winds, the dauntless chieftain roved,  
Taunting with bitter ire the pale-faced slave,  
Who toils for gold from cradle to the grave."

J. K. PAULDING.

## LESSON VI.

### OIL FIELDS.

THE next day Mr. Cartmell and the two boys left Pittsburgh early in the morning for a ride up the Alleghany valley through a part of the oil belt. The railroad runs

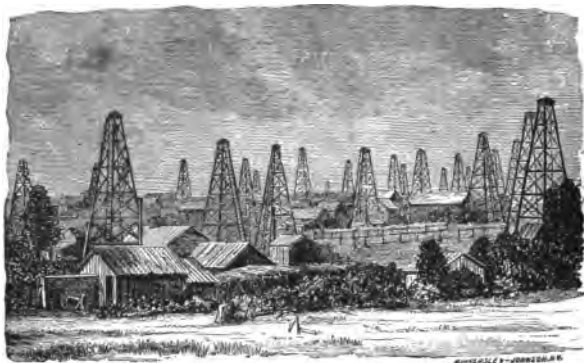


OIL SECTION AND PIPE LINES.

quite near the river in many places, and through a variety of hilly scenery. There were more or less glimpses of the oily character of the country as they rode along.

Mr. Cartmell talked to the boys on the train about petroleum. He said: —

“ One of the new industries is the obtaining of oil from the storage basins in the earth. Oil is found thus stored deep down in the earth in this part of Pennsylvania. The oil belt extends from Pittsburg into New York State.<sup>1</sup> The largest single area lies on the State line, in the counties



AN OIL VILLAGE.

of McKean, Pennsylvania, and Cattaraugus, New York. There are in all this great area nearly four hundred square miles of developed oil-pools.”

Mr. Cartmell and the boys passed in their ride of one hundred and twenty-five miles many small oil villages, in which they saw the derricks rising up like skeleton pyramids. Leaving the train at Oil City, they rode out to one of these small villages, where many wells had been opened, and where the different operations of obtaining oil from the ground were going on.

The smell of oil was everywhere, and sometimes they

<sup>1</sup> It is enclosed on the map by light lines.

could see it floating on the top of the small streams as they crossed them.

"Are large quantities of oil obtained from these oil fields, Father?"

"Yes. The wells of this country now produce millions of gallons every year; so much is now exported that petroleum has become the fourth most valuable export."

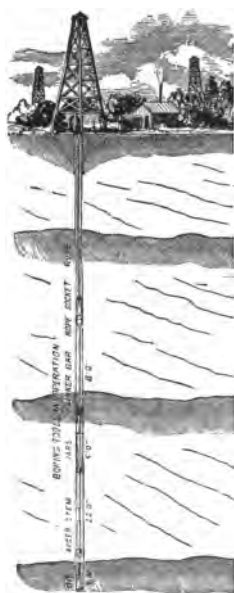


ANOTHER OIL VILLAGE.

"How do they get the oil from the ground, Father?" Fred inquired.

"The general principle is plainly shown in this rough sketch on this advertisement. An oil well means an artesian well sunk down hundreds of feet to the oil-producing sands beneath. After the well is made the oil flows out, or it is pumped out."

Driving westward about two miles to Mr. Jones's farm, where a new well was being bored, the boys saw the different steps in the work. The superintendent told them that after selecting the spot where they thought best to sink a well, he first erected the derrick and engine house, as seen in the picture.



PLAN OF SINKING AN  
OIL WELL.

"How high is your derrick?" George asked.

"It is eighty feet high. You see it supports by ropes the rods and drilling instruments. We have been at work drilling this well for several days. The first day we drove down twenty feet of *drive-pipe*, six inches in diameter, and each section about ten feet long. We then came to *bed-rock*, and were obliged to begin to drill.

"We first cleared out the earth which was in the drive-pipe; then a *sinker-bar*, or long piece of iron, was attached to the wire rope which you see passes through the pulleys at the top of the derrick, and down to the cross-beam at the foot of the derrick. To the sinker-bar is screwed these *jars*."

"What are they for?" inquired Fred.

"To start the drill loose by jarring it after it has struck the rock. The drill would wedge in every time if it were not knocked loose by the blow of the jars. Next is attached the *auger-stem*, another iron bar about twenty feet long, and to the end of this, the *centre-bit*, which is what

really cuts the rock by continually dropping. This bit is about three feet long, and is made sharp and hard at the end."



DRIVE-PIPE.

These different parts had been drawn up out of the well just before, and could be seen by the boys and their father. The bit, auger-stem, jars, sinker-bar, and temper-screw reached up more than seventy feet toward the top of the derrick.

"How much do these tools weigh, Mr. Superintendent?" Mr. Cartmell asked.

"Over a ton."

The tools were then let down into the well, and the engine set in motion. This caused the working-beam to rock, and work the tools up and down in the tube about thirty times a minute.

"How far down have you already gone?" George inquired.

"Nearly four hundred and fifty feet."

Mr. Cartmell and the boys watched the drilling for a short time. As soon as the bit had cut into the rock a short distance, the tools were drawn up and the sand-pump lowered down. This pump fills itself with the broken rock, sand, and water at the bottom, which are thus lifted out.

"How much farther do you expect to drill?"

PAIR OF  
JARS.



BIT.

"I don't know; the distance varies here somewhat; the last well was bored to the depth of twelve hundred feet before it began to give out much oil."

"Do all the wells spout?"

"Oh, no. In most cases the wells are pumped."

"Can you increase the flow of a well?"

"Yes, by *torpedoing* it."

"How do you do that?"

"A torpedo filled with dynamite arranged as in the lower part of this cut is carefully lowered into the well by a strong cord. When it reaches the bottom, the messenger to discharge it, which consists of a ball of lead fastened to a tin tube for a guide, is slipped on the line. You can see this in the upper part of the cut. When everything is ready, the messenger is allowed to fall; it strikes the cap in the upper part of the torpedo, and a terrible explosion takes place, which generally opens new veins of oil into the bottom of the well and makes it give out more oil."

"Have you ever seen any remarkable effects from using these torpedoes?" Mr. Cartmell asked.

"Several years ago I was present in another county, at the opening of a new well, when the shot took effect, and the barren rock, as if smitten by the rod of Moses, poured forth a torrent of oil. There was no sudden reaction after the torpedo was exploded. A column of water rose eight or ten feet, and then fell back again, and some time elapsed before the force of the explosion emptied the hole, and the burnt glycerine, mud, and sand

TORPEDO  
HEAD.

rushed up in the derrick in a black stream. The blackness gradually changed to yellow; then with a mighty roar, the gas burst forth with a deafening noise. It was like a thunderbolt set free.

"For a moment the cloud of gas hid the derrick from sight; and then as this cleared away, a solid golden column half a foot in diameter shot from the derrick floor eighty feet through the air, till it broke in fragments and fell in a shower of yellow rain for rods around. In a few minutes the ground around the derrick was covered several inches deep with petroleum.

"A stream as large as a man's body ran down the hill to the road and spread out upon the flats. In two hours the flats were covered with a flood of oil. Dams were built across the stream to save the oil; the dams overflowed, and were swept away before they could be completed. People living near this stream packed up their household goods and fled to the hillsides."

"What do you do with the oil when it comes from the wells?"

"In some places, as at State line, it is stored in small tanks built in the ground not far apart. But it is more commonly stored in great iron tanks, each capable of holding one hundred and fifty thousand gallons or more."

"How is the oil conveyed from this part of the country to the refineries?"

"The oil is no longer carried to the refineries in barrels; nor in iron tanks drawn by powerful locomotives; but it mostly flows through strong iron pipes six inches in diameter. At present trunk lines of pipes stretch from the oil regions across nearly the whole length of New York State and Pennsylvania. These pipes are some-

times buried at a depth of two or three feet; sometimes they lie on the surface. They follow the surface of the country through which they pass, climbing the steepest hills, over high mountains, descending into the valleys, and crossing wide rivers.<sup>1</sup>

“These great pipes pass over beautiful farms, through pleasant little towns and villages, across wild forests and



OIL TANKS.

swamps. One line crosses the majestic Hudson, passes through Central Park and the heart of New York City, thence across the East River, to the refineries on Long Island.

“Lines run to Philadelphia, Pittsburg, Baltimore, Cleveland, and Buffalo. One company owns three thousand miles of iron pipe, and can remove eighty thousand barrels

<sup>1</sup> They are indicated on the map by heavy lines.

of oil in a day. The wells are connected with these trunk lines by two-inch pipes.

"The oil would not move through the pipes without some force, owing to the friction against the side of the pipe; so large and very powerful pumps are used, and the oil has to be pumped into tanks, and then sent on through more of the pipe. The main pipes are made very strong, so as to resist great pressure. The pumping and moving of the oil goes on day and night.

"If the lines become obstructed or clogged in any way, a small instrument is used called a 'scraper.' It has a set of small knives set like the wings of a windmill, and the pressure from the pumps makes these knives revolve and forces the machine forward through the pipe. Men follow along the line, and keep within hearing of the instrument by the noise it makes. If it stops at any place that part of the pipe has to be removed."

The next day the boys and their father returned to Pittsburgh. On their way back George asked about *natural gas*, and its use at present.

Mr. Cartmell said: —

"Natural gas issues from the ground wherever oil or salt abounds. At one time it was regarded as a serious obstacle to a good and profitable oil-well. Sometimes it will come out of a well and catch fire and burn fiercely. A well at East Sandy, Pennsylvania, caught fire several years ago and resisted all efforts to extinguish it. It burned for over a year, lighting up the surrounding country. The rush of gas and flame, roaring like a cataract, could be heard for miles.

"Within a few miles of Pittsburgh, Pennsylvania, are numerous natural-gas wells. The Delameter, in Butler

County, is a remarkable one; it is situated in a valley surrounded by mountains. Gas is taken from this well to furnish light and fuel for the entire neighborhood.

"A part of the gas is allowed to escape through a tube three inches in diameter. This escaping gas is lighted, and it produces a jet forty feet high which shoots forth with a roar that makes the hills tremble and sounds like a thousand locomotives blowing off steam at once.

"Near the flame the earth is scorched, but farther away the vegetation is abundant and resembles the tropics. In winter, ten acres about the well are covered with green grass. During a calm night, the noise of the great burning flame can be heard for fifteen miles."

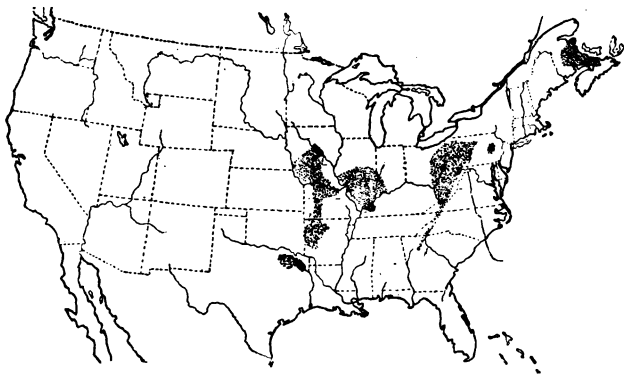
"Is n't Pittsburg now lit with this gas, Papa?" Fred asked, as the train drew near to the city.

"Pittsburg is now illuminated with natural gas, and this product is largely used in place of coal for fuel in the iron and steel mills, in the manufacture of glass, and various forms of industry where power and heat are needed. The gas is brought about twenty miles. Pittsburg can no longer be called the Smoky City. Freeport, Alleghany, and many other places in Pennsylvania and in Ohio are using natural gas at present. How long the supply will last we do not know."

## LESSON VII.

### COAL MINES.

A FEW days later the Cartmells left Pittsburg for Philadelphia. They were on the limited Chicago express, and after obtaining seats in the second coach, went back to the observation car in the rear of the train. Only a few per-



COAL MAP.

sons were in the car at this time, so they obtained very good seats for seeing the scenery. The views as they passed through the Alleghany Mountains were very beautiful. The "Horseshoe Curve," however, excelled the other views in loveliness.

"I thought," said Fred, "that Pennsylvania was a great coal State, and yet I have not seen in this ride any mines. Where are they?"

"It is a great coal State," said his father. "You have seen thousands of carloads of coal on the way, but we have not been moving through mines of course, or very



IMPRESSION OF A FERN IN THE COAL.

near coal centres. You know that the soft coal is found in great abundance in the western part of the State, and hard coal in the northeastern part. The United States has large areas of coal, as this coal-map plainly indicates."

"Of what is coal supposed to be made?" Florence asked.

"Here is a piece," her father replied, "that I picked up a few days ago near Pittsburg. What do you see on it?"

"I see the impression of a leaf."



LANDSCAPE BEFORE THE COAL WAS FORMED.

"Here is another piece. What do you see on this piece?"

"This shows part of a beautiful fern."

"George, what can you see on this third specimen?"

"This looks like a fossil star-fish."

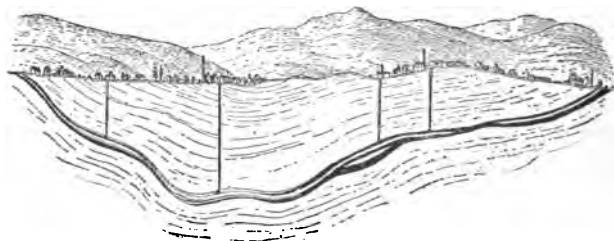
"The finding of these distinct forms of vegetation on the coal, and the finding in mines of large trunks of trees turned to stone, give us good reason to believe that coal comes from decayed and changed vegetation, somewhat as charcoal comes from wood when it is slowly burned."

"Were the trees very beautiful in those days?" Florence asked.

"Yes. They were not only beautiful, but different from vegetation about our home, and there was great abundance of plant-life. When we get home, I will show you a picture of a landscape before the coal-period."

"Is the coal very deep down in the earth?" Nellie asked.

"I will draw a little sketch, Nellie, to show you how coal is frequently deposited in the ground. In this State

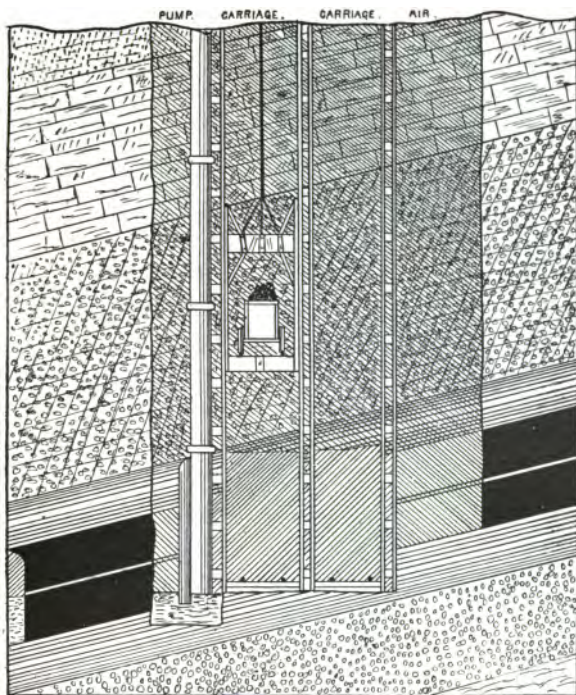


COAL BASIN.

it is usually found in hilly or mountainous sections; but in the West it is found in the level parts of the country.

"I will draw some mountains in the upper part of the sketch, and a few houses to represent a village, beneath which there is very likely a vein of coal, running as indicated by these heavy lines. It comes out to the surface in one or two places, and perhaps the miners will begin to take the coal out at these extremities; but after a while they will sink shafts in different places so as to reach the coal more readily, and be able to work the mine at the same time in as many points as possible. Sometimes the coal is in a mountain, and can be best reached from the side of the mountain."

In the afternoon Philadelphia was reached, and the Cartmells left the train with reluctance; the trip had been in every way so delightful. A few days were spent in the "Quaker City," at the Bingham Hotel on Market



COAL SHAFT.

Street; then Mr. Cartmell proposed a trip to the anthracite coal-fields in the Lehigh Valley. Mrs. Cartmell and Nellie concluded to remain in Philadelphia a day or two longer, and join the others in New York.

Mr. Cartmell, Fred, George, Florence, and Miss Gray

went the following day, by the Reading Railroad, north to Mauch Chunk. They found this town most picturesquely situated in a very narrow valley, so that the village had only

one long, narrow street of any importance. When a house was built on a second street back of the main thoroughfare, it had to be built high up on the hillside, and to be approached by a long flight of steps. The coal mines are situated a few miles out of Mauch Chunk, and much of the coal is brought to town over the celebrated "Switchback Railroad."



SAFETY CAGE.

The second day they rode out to the little village of Nesquehoning, and paid a visit to an ordinary coal mine. This mine was entered by a central shaft, and had most of the modern im-

provements for the safety and comfort of the miners. The central shaft was five hundred feet deep, and divided into four compartments, as shown in the cut.

The superintendent was a very pleasant man, and urged them to go down into the mine, and see the work below ground. They all hesitated to do so; but he showed them

that with the new safety cage there could be very little possibility of an accident, any more than in a well-built elevator in a high building. While he was speaking, the cage came up, loaded with two carloads of coal. Mr. Cartmell examined it, and said he would go down if the superintendent would go with him. Mr. Colesworth readily agreed, and Florence and the boys and their teacher concluded to join them.

"Do you ever have accidents in the shaft, Mr. Colesworth?"

"Very rarely now. But before we put in the safety cage, when we used the barrel, the miners became very careless, and several men were killed going down the shaft."

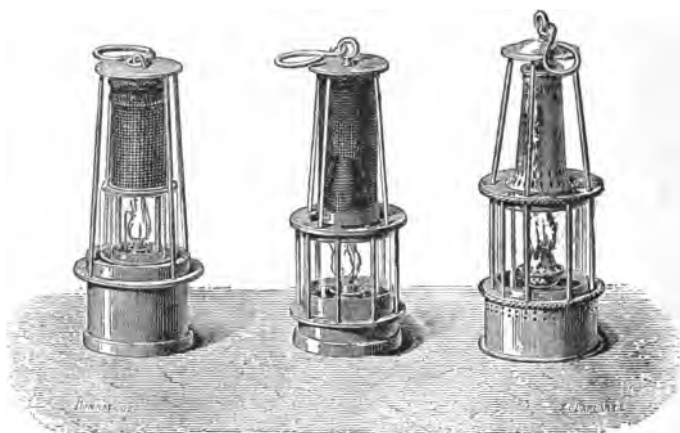
The superintendent gave each one a long cloak to wear to protect their clothes from the water and dust, and Mr. Cartmell and he carried each a safety lamp. These were lighted before they entered the mine.

"The Davy Lamp," said the superintendent, as they entered the cage, "is now made with a glass chimney, and gives a very good light, as well as being safe."



GOING DOWN THE SHAFT.

When they were all ready, a signal was given to the engineer, and the great drum in the engine house, around which the wire rope was wound that held up the cage, began slowly to turn, unwinding the rope; and then the cage with its precious freight began to descend. Down, down they dropped through the comparative darkness,



SAFETY LAMPS.

and in about two minutes they found themselves at the bottom of the shaft. Going a little way to the right, the superintendent brought them to a large chamber, where several men were at work.

While watching the miners, Mr. Cartmell asked about the men and the number employed.

"We have about three hundred men, and pay them so much a carload for getting the coal out. They can make about \$1.75 a day. The control of these men, and the direction of all the work of the mine, is given to the superintendent. Under him is the fire-boss, who has the care of

the ventilation, and who, before the men go to work in the morning, must examine carefully all places where there is danger from gas. Then there are carpenters, blacksmiths, masons, track-layers, and boys, and last, the miners and laborers."

"What can boys do in this place?" asked Miss Gray.



GENERAL VIEW OF MINING.

"They drive the mules that draw the cars, or open and close the doors as the cars pass through. The drivers have a busy life, and are active and noisy. Their duty is to take the empty cars to the chambers, and bring the full ones to the foot of the shaft. The work of the poor door-boy is easier, but less varied. He must sit all day by his door in the dark gangway, with no one to speak to, except when other workers pass."

"How old are these boys?" inquired Miss Gray.

"None under fourteen years of age are allowed to be inside the mine; but boys of twelve may be employed on outside work."

"Why do you prefer mules in the mines to horses?" Fred asked the superintendent.



HORSES IN ENGLISH COAL MINES.

"Because they are tougher, will endure hard usage better, and it does not cost so much to feed them. We have some mules here which have been in the mine ten years. In some neighboring mines horses are used, and frequently in English mines."

"How do you get fresh air into the mine, Mr. Colsworth?" Florence asked.

"It is done," said the superintendent, "by forcing the bad air out; then the good air rushes in to take its place. A large fan, like a windmill, draws the air from the airways, and the new supply comes in by the shaft, and goes

through all the passages. Sometimes partitions, or gates are placed to direct this current, and send it where it is most needed."

He then led them to the bottom of the shaft, and opened a sliding door in the cold-air section, so they could feel and breathe the fresh air.

"In mines don't you ever come across springs that cause trouble?" inquired one of the boys.



DIGGING OUT THE COAL.

"Yes; a basin is always formed into which all the water of the mine drains, and from which an engine pumps it to the surface through this iron pipe." (See p. 75).

"How long are the gangways in this mine?"

"Our longest gangway goes out now nearly a mile from where we stand. We have some new ones leading from this long one, which are quite short and easy to reach. Would you like to go to the end of a gangway, and see the men at work in that place?"

As they had become accustomed to the darkness, noise, and dirt about them, no one hesitated to go wherever the superintendent led the way. He took one lantern, and

Mr. Cartmell with the other followed behind the children and Miss Gray.

As they passed through the main gangway, they noticed the iron tracks laid down for the loaded coal-cars to run on. They saw the water running in the middle of the passage-way toward the main shaft. They were surprised to find the sides of the gangway heavily timbered.

"Why do you use all this timber, Mr. Colesworth, on the sides and overhead?"

"If we did not do that this passageway would cave in, and choke up; the men would become imprisoned, perhaps, and we could not get out the coal."

As he stopped speaking they heard a rumbling noise in front of them, and saw a faint light ahead. The superintendent waved his lantern, and called "Halt!" Then he asked the visitors to step into a side-opening, and wait till the loaded cars passed by. After going to the next side gangway, he led them into a smaller opening, and they soon found at the end two men getting out the coal with picks and hammers.

"What a small, narrow place this is to work in!" exclaimed Fred.

"More than two hundred of our men are working in just such places," said the superintendent.

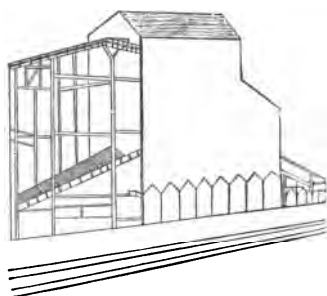
"Do the miners use gunpowder?"

"Oh, yes. These men drilled their holes early in the day, and fired the blast some three hours ago. Of course they go away some distance when the explosion takes place. After it is over, they return and examine the roof and walls. If they appear weakened, then the miners must strengthen them with hard-wood props, which the company furnish."

Mr. Cartmell signified to the superintendent his readiness to return to the outer world, which they did in about half an hour. At the top of the mine they were shown the revolving fan, which removes the bad air, and ventilates the underground chambers where they had been.

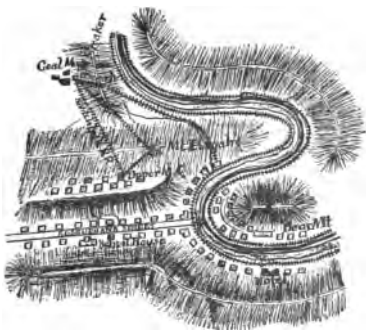
"I suppose," said Fred, "you send the coal directly from the mouth of the mine to the large cities to be burned."

"Not usually. It has to go first to the coal-breaker, which is about two miles distant."



COAL-BREAKER.

Mr. Cartmell bade the kind and obliging superintendent "good-day," after thanking him for his assistance, and drove to the coal-breaker.



MAUCH CHUNK.

George made a hasty pen-and-ink sketch of the breaker and a map of Mauch Chunk. They learned that the coal when it comes from the mines is of several different sizes, and contains a large quantity of slate, stone, and dust. It is taken into the breaker at the top, and passed through inclined

and revolving wire cylinders, by which it is separated into different sizes, and most of the coal-dust taken out. The slate has to be picked out by boys, who sit near the in-

clined shutes, and remove the slate and other rubbish as the coal slowly passes by them. About fifty boys were employed in this breaker, besides as many men. The dust and noise were so disagreeable that the visitors soon withdrew.

On their way home, Mr. Cartmell told them about the dangers of the mining business from the falling in of the roof, the collecting of suffocating gases, the explosion of these gases, and the constant danger of fire and water.

"When we know," said Mr. Cartmell, "something about the dangers and work of mining coal, and bringing it hundreds of miles to our homes, and think how many times every pound has been handled, what a wonder it is that we can buy it for only five or six dollars a ton!"

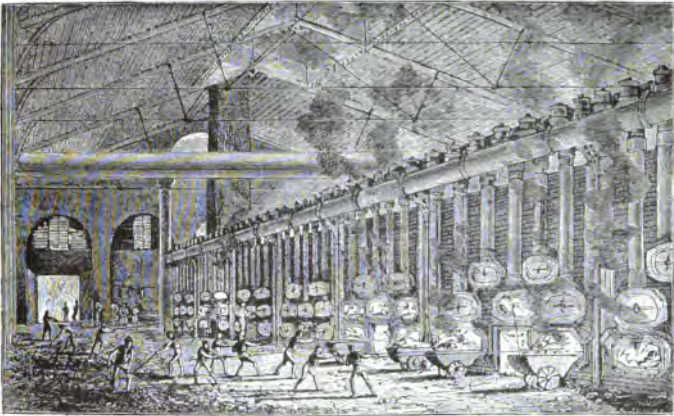
While riding back to Mauch Chunk, George said, —

"Papa, I notice there is not any snow on the sides of that hill, while the other hills are covered."

"I can see smoke coming from the top of the hill," added Fred.

"The mine under that hill is on fire; it has been burning over ten years. They have tried to smother the fire by sealing it up air-tight with clay, but still it burns. This mine is so high up it cannot easily be flooded, as is frequently done, to put out the fire. Then the water is pumped out as soon as the fire is extinguished. The miner is also in danger of being drowned by the sudden accidental flooding of his mine. His greatest danger, however, comes from gas-explosions. If such an accident had taken place while we were in the mine, at the end of the gallery, it might have killed us at once by the force

of the explosion; it might have caused the rocks and coal to have fallen down and cut off our retreat; if it took place in another part of the mine, and we had rushed toward the central shaft, the bad gases might have driven out the air and suffocated us, or perhaps the explosion might have destroyed the main shaft, and cut off our retreat entirely.



MAKING ILLUMINATING GAS.

“I lately read about two brothers in a mine in Wales, who were thrown down senseless by an explosion. They gradually recovered their senses, and began to move toward the exit; but the air was so heavy and hot they nearly fainted away. John bathed his head and his brother’s with tea from his lunch-basket, and they started again. They crawled on their hands and knees, in the midst of darkness, over the bodies of their dead comrades, and at last regained the light of day, leaving forty-seven dead miners behind them.”

The next day Mrs. Cartmell and Nellie met the rest of the family in New York, and they returned together to Boston and Lake View, after several months of wandering.

They visited not long after the gas-works in a neighboring town, where they saw the workmen put soft coal into long horizontal tubes, called "retorts," and then heat these tubes till the gas passed off through a large iron tube at the top. After the gas had been carefully purified, it was conducted to the "gasometer," from which it passes to the houses, where it is used for light or heat.

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#### . LANGUAGE LESSON.

WRITE about Coal, looking at the following topics for suggestions:—

1. The great Coal States.
2. Formation of Coal.
3. Location of Coal in the Ground.
4. Mauch Chunk and the Lehigh Valley.
5. A Coal Shaft.
6. Going down a Mine.
7. Safety Lamps.
8. Boys in Mines.
9. The Main Gangway.
10. Digging out the Coal.
11. The Breaker.
12. Accidents in Mines.

## LESSON VIII.

### AMERICAN SCHOOLS.

AFTER months of travel, it was pleasant for Mrs. Cartmell and the other members of the family to be at home once more.

All the children but George entered at once their respective classes in the grammar school of Lake View. George studied at home, and recited to Miss Gray. In the afternoons he developed and mounted many photographs which had been taken on the Southern trip. In the evenings books of travel were read and discussed, and new topics taken up.

One evening Miss Gray began a talk upon **Our Schools**, by asking Nellie where she first went to school.

"I went first to a little kindergarten, kept by Miss Rust. She was a lovely teacher."

"What did you learn there?"

"We first had worsted balls representing six different colors; then we had blocks, of various kinds and sizes, with which we learned to build houses, chairs, tables, and steps. We also had sticks, with which we made beautiful designs; after the sticks we had clay for modelling, bright worsteds for embroidery, and colored papers, which we learned to cut into different shapes for folding and pasting. But I liked the paper-weaving as well as anything we did in the kindergarten."



KINDERGARTEN, DEARBORN DISTRICT, BOSTON.

"Did n't you have songs and plays?"

"Yes; Miss Rust always played with us several times a day, and we sang quite frequently."

"Where did you first go to school, Florence?"

"I went to the primary school first. My teacher's name was Neale. Her room was full of pictures, charts, and printing in colored chalks. She taught us how to read by the sentence-method. We generally read something new every day. She had clay-modelling, paper-cutting, and writing, as well as numbers up to ten. I was in the primary school three years. At the end of the third year I could write, say the tables, do simple examples in numbers orally and on paper, and read at sight in any third reader."

"What are you learning in your grade, Fred?"

PRIMARY SCHOOL, YEOMAN STREET, BOSTON.



"I have been in the grammar school now three years. The longer I stay in the school, the better I enjoy the work. Our principal, Mr. Hill, is so pleasant, and knows so much, he makes his pupils want to learn just by his example. My favorite studies are geography, history, and arithmetic. We are taught geography by topics instead of committing to memory the text-book.



SEWING IN THE GRAMMAR GRADE.

"We draw maps, make raised maps, and we bring in pictures and specimens. About once a week Mr. Hill takes us into the hall and shows us pictures with the solar camera. Then we read to the teacher from our supplementary readers, and from books we get from the town library. We are reading history this year; next year we shall study it. In arithmetic our teachers ask us

to make up examples, and we have races for accuracy and quickness. We write compositions every month. I wrote last time about our trip to Florida, and the teacher said it was the best one in the room. We ask one another questions in several studies, and in the upper classes they have debates, and the graduating class has an exhibition in June."

"We also have sewing and cutting," said Florence, "in the grammar school. We spend two hours a week in this work, and I like it very much. Last year I made a night-gown at school, and this year I am taking lessons in cutting out dresses. At the time of our Visitation Day, the sewing in our school was exhibited in the hall, and many of our parents and friends came to see it. The next day a photograph was taken of the display."

"I hope," said George, "to attend some high school or academy next year."

"The high school in Lake View is so small," said his father, "I am thinking of sending you to one of the high schools in Boston. I can do that by paying tuition. In that city they have graded high schools. There is a large high school for boys; another for girls; a Latin school for boys, and one for girls; and in the suburbs, various high schools for both boys and girls. In Roxbury there is a private Latin school for Roxbury boys, which prepares students especially for Harvard College.

"If pupils wish to study algebra, geometry, physics, chemistry, drawing, English literature, French, or German, they attend the boys' or girls' high schools; if they wish to prepare for college, they go to the Latin schools."

"What kind of buildings are erected for high schools, Mr. Cartmell?" Miss Gray inquired.



ROXBURY HIGH SCHOOL, BOSTON.



DILLAWAY GRAMMAR SCHOOL,



ENGLISH HIGH SCHOOL,

"High-school buildings will be found everywhere among the largest and best public buildings in the country. In Boston the English High and Latin School building is said to be one of the largest and finest school-structures in the world. It ought to be, as it cost nearly a million dollars.

"Roxbury, a suburb of Boston, has just erected a local high-school building, which cost about half a million dollars. It is furnished inside in hard wood, with iron stairs, wide corridors, spacious waiting and toilet rooms, a grand hall, all parts lighted with gas and electricity, so ventilated that the air is changed every few minutes, and with all the conveniences of a modern hotel except beds.

"Cambridge has just dedicated a fine building; Denver, Sioux City, and other Western cities boast of their fine high schools. Fall River has perhaps the most costly structure in the country, the gift of private generosity."

"I would rather go to a manual training school," said Fred, "when I get through the grammar school, than to go to a high school."

"Perhaps I shall send you to one," said his father. "I have visited several such schools in different parts of the country. One of the first large manual training schools in the country was opened several years ago in Philadelphia. It was a part of the public-school system, and corresponded in grade to a high school. The boys worked three hours, and studied three hours. One of the best and largest of the high grade manual training schools is the Pratt Institute, Brooklyn.

"Mr. Rindge built and endowed for his native city of Cambridge a fine manual training school. Boys who have



RINDGE MANUAL TRAINING SCHOOL, CAMBRIDGE.

passed their examinations for admittance to the high school are permitted to select the manual course. They work three hours a day under the teachers of the English High School, and three hours under the teachers of the Manual Training School, devoting two hours to the bench, and one to drawing."

"I wish that we could visit such a school," said Florence.

"That is an excellent idea," said Miss Gray. "If your father is willing, I will take you all to-morrow to see a manual training school for grammar pupils."

Consent was readily given, and Miss Gray escorted her friends to Boston Highlands, or Roxbury, where they found such a school in the old high-school building on Kenil-

worth Street. The first floor was fitted up for a sloyd, or carpentry, school. Each room contained twenty-four benches, and each bench was supplied with a set of tools, such as saws, hammers, planes, chisels, squares, etc.

The lesson this day was in making a block of wood of given size with square ends. The teacher first called the class around him, and gave the lesson, showing the boys



CARPENTRY WORK, DEARBORN BOYS, ROXBURY, MASS.

the various steps in doing the work. Then the boys went to their benches and followed the directions given, using in so doing measure, square, saw, and plane. Every boy worked with a will, and seemed happy in the task. After watching them for a while, Miss Gray remarked, —

“I do not see an idle boy in the room.”

“We have no idle boys here,” said the teacher.

“What a noise they make when they all plane at once!” exclaimed Fred.

“Will you be kind enough to tell me what other lessons you give in this course, Mr. Leavitt?”

"We have given, or shall give, lessons in the use of tools, joining and dowelling, mortise joint, gauging, sand-papering, and in making a towel-rack, a book-rack, a knife-tray, a boot-jack, a box, a bracket, a drawer, a bench, etc."

"How much time do these pupils give to the work?"

"They come each week to this building from the grammar schools in the vicinity, and spend one half day here. Their regular teachers always come with them."



PART OF A COOKING SCHOOL, BOSTON.

Miss Gray, after thanking Professor Leavitt for his kindness and attention, went upstairs into one of the cooking classes. The upper rooms are each furnished with three tables for eight girls apiece, so that a class of twenty-four may be instructed at one time. One girl had charge of the fire, and she was called housekeeper No. 1; another, housekeeper No. 2, looked out for the dusting; housekeeper No. 3 washed the dishes.

The lesson at this time was *meat cakes*.

The teacher explained her method to Miss Gray as follows:—

“Each lesson is complete in itself, and the girls are expected to practise at home in making the same dishes they make in the class-room. Most of the girls do this, and at the end of the year we give a cooking exhibition of dishes made and articles cooked by the girls at home. It is sur-

prising how much they learn to do in one course of thirty lessons.”

“What are some of the lessons you



ST. JOHNSBURY ACADEMY, VT.

give in the course of thirty afternoons?”

“We have already had these lessons: How to make and keep a fire, use of stale bread, baked apples, crackers and cheese, mashed potatoes, eggs, invalid cooking, custards, rice, and oatmeal, vegetables, bread, and meats.”

The next evening Mr. Cartmell and Miss Gray talked about what is often called “the higher education.”

"I began my education," said Mr. Cartmell, "at the country academy. These are private high schools, and have done an immense amount of good in this country. I should be very willing to have George attend such a school as the academy in St. Johnsbury, or the one nearer home in Andover. Graduates from such schools receive a good



NEW YORK NORMAL SCHOOE.

preparation for college, or a fair training in an English course."

"Where did you attend school, Miss Gray?" Nellie inquired.

"I was graduated from the Bridgewater Normal School; my younger sister went through the New York City Normal School."

"What do you study in a normal school?" Florence asked.

"We study the laws of the mind, the history of education, the principles and methods of teaching different branches. We observe how experienced teachers teach in the practice schools. Bridgewater is one of the oldest

MAIN BUILDING, WELLESLEY COLLEGE.



STONE HALL, WELLESLEY COLLEGE.

normal schools in this country. It is a State institution; there are other State normal schools at Salem, Worcester, Westfield, and Framingham. Almost every State in the land has one or more such schools; Boston, New York, Philadelphia, Chicago, and many large cities have normal schools, or training schools, of their own."

"Where did you go to school before you went to the normal school, Miss Gray?"

"I went through Wellesley College. Those were four very happy years of my life. I was in the first class which graduated. The college is beautifully situated, a few miles out of Boston, on grounds consisting of groves, lakes, and lawns; the main hall and numerous cottages are picturesquely located near the centre of the grounds."

"What did you study there?" Mrs. Cartmell asked.

"I studied about the same studies a young man would take in a college. I took Latin, Greek, French, German, social science, constitutional history, botany, experimental physics, higher mathematics, and English literature. The courses are similar in Vassar, Smith, and Bryn-Mawr."

"As you are beginning to think about college and college life, George, perhaps you can tell us the names and localities of some prominent American colleges."

"The oldest college in this country is Harvard University, whose first class graduated in 1642, containing nine members. The number of students who now yearly graduate is over five hundred, while about fifteen hundred are members of the college and nearly three thousand of the different departments. Other great colleges are Yale in New Haven, Princeton in New Jersey, Columbia in New York city, Brown in Rhode Island, Dartmouth in New Hampshire, Williams and Amherst in Massachusetts, Johns Hopkins in Baltimore, Cornell University in New York State, Girard College in Philadelphia, Clark and Boston Universities in Massachusetts, Tulane University in Louisiana, Leland Stanford, Jr. University in California. Thirty different States have State-established colleges."

George's account of the colleges in the country created

HARVARD COLLEGE QUADRANGLE.



so much interest that the children begged their father to take them to see how a college looks. He was well acquainted with several professors at Harvard, so he took



SEVER HALL,  
CAMBRIDGE.



LAW SCHOOL, HARVARD COLLEGE.

his family to Cambridge. Professor H. first took them all across the college yard, which contains about fifteen acres, tastefully laid out and adorned by many stately elms. Here they saw some fifteen extensive buildings,

forming a large quadrangle, or open enclosure. "Most of these buildings," said Professor H., "are used as dormitories, or they contain rooms for sleeping and study. They are known among the college boys as Matthews Hall, Massachusetts Hall, Holworthy Hall, Hollis Hall, etc. This stone building here is Appleton Chapel, where morning prayers are conducted by "preachers to the University." Gore Hall contains the college library of 300,000 volumes. One of the largest and finest of these brick structures is Sever Hall, used for recitation rooms."

The professor showed them several recitation-rooms, and the children were astonished to learn from him that young men in college sometimes fail and make sad blunders in recitation, just as smaller people do.



HEMENWAY GYMNASIUM.

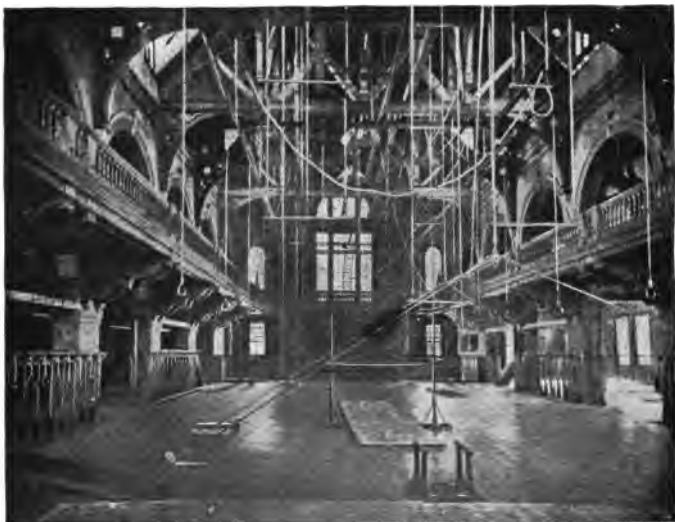
The professor next escorted them to Austin Hall, which is used for the Law School, a very prosperous department of the University.

There are also a Divinity School, a Medical School, a Scientific School, and several other important departments.

"Have you a gymnasium, Professor?" George asked.

"Yes, one of the best in the country. Come with me and I will show it to you. It is furnished with the best kinds of ordinary gymnastic apparatus. It has many new appliances for developing the different parts of the body. Many students practise here daily."

While the boys were visiting and examining the gymnasium, Mr. Cartmell and the others went into the celebrated Museum of Natural History founded by Professor Agassiz, "the great teacher." Here they saw arranged in different rooms specimens of all kinds of animal life, from the tiniest



INTERIOR HEMENWAY GYMNASIUM.

creature which inhabits a pool of water up to the mastodon and whale.

The two parties met again in Memorial Hall, by far the largest and finest building at Harvard. It is built of red and black brick trimmed with Nova Scotia stone, surmounted by a beautiful tower two hundred feet high. They first entered the vestibule, which is a great hall sixty feet high and surrounded by marble tablets containing the names of the different college departments and the

names of the one hundred and twenty students who fell in the civil war. Then the professor led them into the gallery of the dining-hall. "This hall," he said, "is large enough to seat one thousand persons at once. It



DINING-ROOM IN MEMORIAL HALL, HARVARD.

is one hundred and sixty-four feet long. The walls are adorned with portraits of noted men connected with the college."

While he was talking over five hundred students came in to dinner. The dinner was served with the same elegance and refinement seen at the best hotels, and the expense to the students is only a little above cost.

At the other end of Memorial Hall they saw Sanders Theatre, which is used for Commencement exercises, lectures, concerts, etc.

On their way home Mr. Cartmell said: "To see the College grounds and buildings and one or two professors, as we have to-day, gives you only a poor insight into college life. One must live with the boys and study year after year thoroughly to understand what it means to go through college.

"We have had no time to see or to learn about the great technical schools, such as the Institute of Technology, or the private and parochial schools. Free public schools have helped to make this land great and prosperous. The people in the different States and cities vote their money freely to support these schools, and the poorest child can in the United States obtain almost without cost a well rounded education."

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## LESSON IX.

### ALONG THE SHORE.

AFTER the haying was finished, Mr. Cartmell proposed a trip to Newport for a change.

This place, with its fashionable life, its beautiful residences, and attractive drives, delighted them all.

They saw of course in their ride the historical Windmill, the Casino, a beautiful place for entertainments, the Glen, the Dumplings, or the entrance to the harbor, and Fort Adams.

Then the driver left them at the ocean end of the main street, called Bellevue Avenue, and they returned on



foot by way of the Cliff Walk. Here they passed cottage after cottage, with all their beautiful gardens and lawns, and handsome English-like grounds on one side, and the restless sea on the other. For three miles this beautiful panorama unfurled itself, ever new, ever beautiful, ever fascinating. Such a walk as this is not paralleled in this country, if in Europe.

"I don't see why these great big houses are called cottages, Papa."

"No, my daughter; they are hardly cottages on account of size, shape, or cost. Perhaps it is because they are by the sea."

"Do you suppose, Mr. Cartmell," inquired Mrs. Cartmell, "a more costly row of houses or a more beautiful series of homes can be found in America,—even in the great cities?"

"I think not. The most costly houses on Commonwealth Avenue, Boston, Fifth Avenue, New York, and Michigan Avenue, Chicago, are the same style and shape exteriorly, while these are all different."

When they reached the bathing beach, the children had a good run upon the sand. Here they re-entered their carriage, and rode across the city to the harbor.

As soon as they reached the harbor, Mr. Cartmell and his family were invited into a fine boat, and rowed out to a beautiful large steam-yacht, or tender, lying quietly at anchor among the other boats. Arrived on board this well-appointed boat, the children found Mr. French, an old schoolmate of their father, whom they had once before seen at Lake View. He showed them the craft with all the pride and love of an owner. After the inspection, he bade them all good-day, saying, "I expect to return in two or three weeks to Newport. I wish you all a happy voyage." Then he hastened to the landing in the same boat which brought them to the ship, and took the next train for Washington.

No sooner had he disappeared than everybody except Mrs. Cartmell began to ask questions of Mr. Cartmell. The secret he could keep no longer, so he made a brief

explanation. "Mr. French, my classmate and Miss Gray's especial friend, has been suddenly called away on very important business; he has therefore very kindly offered us the use and enjoyment of his steam yacht, 'Verbena.' Now I propose to take you from day to day **along the shore** of the Eastern States."



NEWPORT HARBOR.

The captain and crew were instructed by Mr. French to receive, during his absence, their orders from Mr. Cartmell, so the latter said to the captain, "Sail for New Bedford to-morrow, at 9 A. M."

At the appointed hour the captain weighed anchor, and steamed out among the many beautiful yachts, the great Sound Steamers, tugs, revenue cutters, and coastwise schooners.

The sail from Newport down Narragansett Bay to the

open ocean was delightful, as they passed a number of islands, small bays, and points. The water that day was quite calm, so that no one suffered from that dreadful disease, sea-sickness.

As they sailed along, the captain told them interesting stories, and the names of the islands and points which were passed.

The approach to New Bedford is very delightful, as the city is situated on a hillside, and can be well seen from the harbor. The wharf where they landed had often presented in the past lively scenes, when whalers had just returned, and landed large loads of oil. "Such scenes," the captain said, "were years ago common, both here and in Nantucket; but very little oil is now secured. New Bedford has turned its oil capital into cotton mills; and it manufactures now thousands of yards of the best cotton cloth in the market."

They drove for two hours through the beautiful streets of the city. In the ride they saw many fine residences, with ample grounds about them, handsome churches, great cotton mills, and a fine high-school building, from the cupola of which they obtained an extensive view of city, harbor, and surrounding country.

From New Bedford the party sailed the next morning for Martha's Vineyard. They met many coasting schooners, passing from Boston and Portland to New York by way of the Sound.

A few hours were spent in Cottage City. George and Fred hired bicycles, and enjoyed a "spin" over the miles of concrete streets, for which this place is justly celebrated. Mr. Cartmell and the rest drove about in a barouche. They saw a real city of cottages and tents by the sea.



OIL ON THE WHARF, NEW BEDFORD.

They all returned to the yacht for dinner, after which they proceeded to Nantucket.

Here they all took a walk through the streets of this quaint old town, and became acquainted with some of its people.

As they were going through the principal street, about nine o'clock in the evening, they heard a man across the street ring a bell, and then cry out so as to be heard a long distance: "Found on North Water Street, a small pocket-

book containing a ring, and money. — Fire this morning in Sconset. — Schooner 'Wauwinet' just arrived from Boston. — Lost or strayed away this forenoon, Johnnie Sherburne, five years old. He had on a brown straw hat, blue dress, and new shoes. A suitable reward to the one who returns him to 15 Gay Street."

"Why, Papa, is that man crazy?"

"No, my dear. He is the town crier. They do not have any daily paper here, and so they keep up the old custom, once common in many New England villages, of having a man go about and announce the news."

In the morning a walk through a part of the town showed them many quaint and queer homes.

In the cemetery Fred discovered on one of the stones this epitaph: —

"O stop, my Reader, and spend a tear;  
Think on the dust that slumbers here.  
And when you see the fate of me  
Think on the glass that runs for thee."

George took a stroll before breakfast and discovered in the suburbs an old windmill standing upon the brow of a hill. The mill was a curious structure, weather-beaten and useless. Opposite the sails was a long, projecting shaft fastened to a large cart-wheel, by which to change the sails when the wind changed. This mill was erected in 1746.

Then the yacht blew its whistle and weighed anchor for a long trip around Cape Cod.

Miss Gray told them about some of the places on shore.

"At the extreme end of this narrow curved peninsula stands the little village of Provincetown, called 'the jump-

ing off place.' The houses skirt the harbor, and are nearly all built of wood. City people like to go there in summer because everything is so peculiar and the climate is so cool."

"Can the children tell me how connected with history?"

No one could tell, so Miss plained: "The 'Mayflower'

this place is

Gray ex-  
first cast



OLD MILL, NANTUCKET.

anchor in Provincetown. Here the Pilgrims signed the first compact of government. Here the first child of English parentage was born."

"What was the name of this child?" Fred asked.

"It was Peregrine White, so called because the Pilgrims were still on their *peregrinations*, or travels, given by the General Court two hundred and on account of his father's name."

Mr. Cartmell told them that the rest of the trip for that day would take them over the same waters as those traversed by the "Mayflower" when she crossed Cape Cod Bay, carrying her precious load to that —

"Stern and rock-bound coast."

About four o'clock the "Verbena" steamed by that long, narrow tongue of land called Plymouth Beach, and turning a right angle entered the bay and harbor of Plymouth.

The first object seen from the wharf when they landed was the canopy over Plymouth Rock. All hastened to get a nearer view of a spot dear to New Englanders.

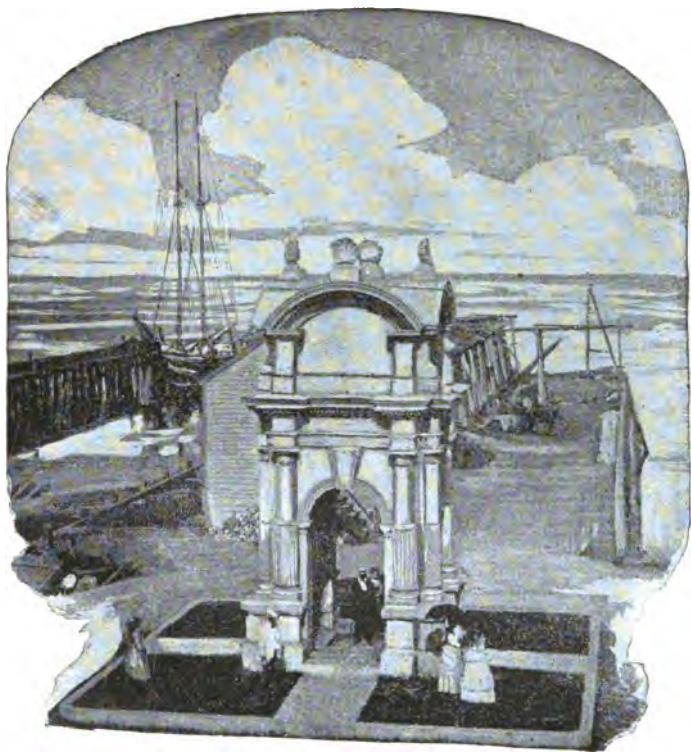
"How small the rock is," said Florence, "for people to talk so much about it."

"Why, it is not now touched by the water!" exclaimed Fred.

Mr. Cartmell explained how the shores had changed since Mary Chilton stepped upon the rock on that noted December day.

Mrs. Cartmell remarked: "The rock may be small, Florence, but it is memorable, and great as a representative of worthy ideas."

After supper they rode to the other end of the town, where the National monument stands, surmounted by the colossal statue of Faith, then to the burying hill, where they found many old gravestones bearing historical names. There is a fine view from the burying ground of the harbor and town. Early the next morning they spent two hours in Pilgrim Hall, looking at the pictures and curiosities pertaining to the Pilgrims and early settlers of Massachusetts, after which they hastened on board their



PLYMOUTH ROCK.

beautiful yacht, and proceeded past Boston to the North Shore.

As the North Shore appeared they all noted the difference, as seen from the deck of the vessel, between this shore and what they saw in the morning. The South Shore is mainly low and sandy; the North Shore higher and rocky. This characteristic is first shown at Cohasset, and then at Nahant, a rocky peninsula just north of Boston. The

next high rocky peninsula is Marblehead Neck, passing round the northern point of which they sailed into the harbor of Marblehead.

The following day they visited different parts of the town and noted how frequently large mansions were seen



MAGNOLIA.

by the side of very poor and meagre houses, the homes of humble fishermen, whose honest labor in the past gave this place a worthy position in history. The fishing business is now largely superseded by the boot and shoe business.

The next day they sailed at an early hour northward, passing Manchester with its elegant summer residences,

and Magnolia with its rough stony shores. The latter is well represented in the picture.

A few miles beyond Magnolia they sailed by Norman's Woe, and Florence repeated a portion of Longfellow's poem, "The Wreck of the Hesperus."

Then they ran into Gloucester Harbor and obtained a fine view of the city, the largest fishing-town in New England.

"What kind of fish are caught, Papa, by the fishermen in this town?" inquired Fred.



GLOUCESTER HARBOR.

"Cod, mackerel, and herring. About four hundred vessels employ five thousand men to carry on the business."

Leaving the great fishing-town behind, our travellers soon doubled Cape Ann, and passing by the celebrated granite quarries, steamed direct for Portsmouth, after passing the mouth of the Merrimac River.

After a pleasant half day spent among the places of interest in Portsmouth, the "Verbena" was ordered to steam for Portland. As they passed in plain sight of the Isles of Shoals and Boan Island, Miss Gray read to



ISLES OF SHOALS.

the children from Mrs. Celia Thaxter's poems the one called "The Watch of Boan Island." This is one of the stanzas: —

" Aloft the lighthouse sent its warnings wide,  
Fed by their faithful hands, and ships in sight  
With joy beheld it, and on land men cried,  
' Look, clear and steady burns Boan Island Light.' "

In this delightful afternoon's sail, the Cartmells passed many points of interest, among which were York, the "Nubble," Wells Beach, Kennebunkport, and Old Orchard Beach.



THE NUBBLE, YORK, MAINE.

These are all noted summer resorts, to which people from Boston and other New England cities go to spend their summer outing. The "Nubble" is visited by those who wish to see the water dash upon the rocks. Old Orchard Beach is remarkable for its fine rolling surf.

At six o'clock they anchored in Portland Harbor.

## LESSON X.

### AMONG THE LIGHTHOUSES.

#### *Part I.*

AT seven o'clock the next morning, Captain Graham called out, "All aboard."

In a few moments the "Verbena" was steaming down Portland Harbor for a cruise **among** the **lighthouses** and numerous islands off the coast of Maine.

The Cartmells, standing at the stern, surveyed the lovely scene, for Portland Harbor is well known for its natural beauty. The houses rise one above another on the hills from among the green trees; the spires of the many churches point heavenward; and on the port side Fort Gorges rises from its foundations of natural rock.

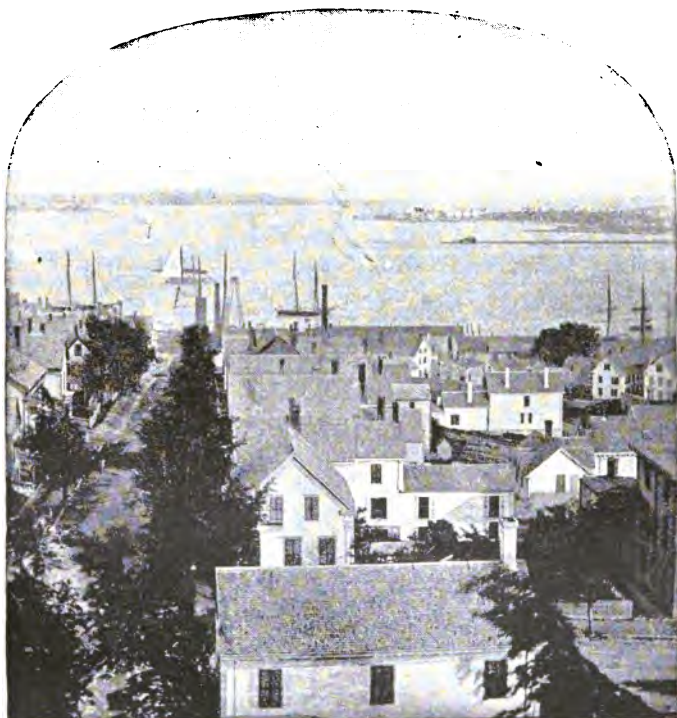
They soon passed the handsome Portland Head Light, a little off to the right.

The "Verbena" was then headed due east, and in half an hour they were approaching Half-way Rock, on which stood a tall lighthouse, plainly seen from the steam yacht.

"I wish we could go ashore, Papa, and visit a lighthouse."

"We shall do so, I think, several times."

Mr. Cartmell spoke to the captain, and he steered more to the port, heading chiefly for the little island. The boat was lowered, and Mr. Cartmell and the children were rowed by the oarsmen to the lighthouse. The lighthouse



PORTLAND HARBOR.

keeper received them very politely, and said that he would gladly show them the interior of the tower.<sup>1</sup>

The first room they entered was the store-room, at the base of the tower. Here they saw casks of oil, barrels of provisions, and plenty of coal. Here is kept the supply of fresh water. The keeper led the way up the narrow circular iron stairway to the next room, which proved to be the kitchen of the establishment, with its cooking-stove,

<sup>1</sup> See page 123.

shining pots and kettles, and neat pantry. Another flight of stairs brought them to the bedroom of the keeper who was their guide, and above this was a second room with two beds for the assistant keepers.

A fourth flight of stairs led them into the watch-room, where the keeper on duty stays to look after the light



PORTLAND'S HEAD LIGHT.

during his night to watch.

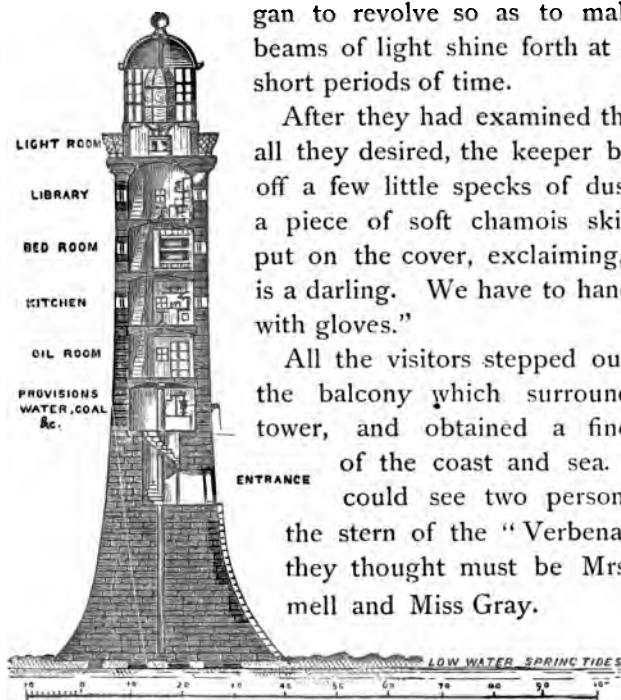
The clock which operates the light is placed in this room. After one more staircase, the fifth, had been mounted, they entered the "lantern," a room on top of the tower.

As soon as they all had satisfied themselves with the views, and looked down upon the "Verberna," as she waited for them not far away, the keeper took off the linen cover from the lenses. The children looked with astonishment upon the great glistening barrel of glass exposed to view. The keeper opened a door in this barrel of lenses, and

showed the powerful lamp within with its numerous wicks. Then the keeper touched something, and a large bronze framework outside of the glass barrel, containing red panes of glass set at certain intervals, began to revolve so as to make red beams of light shine forth at certain short periods of time.

After they had examined the light all they desired, the keeper brushed off a few little specks of dust with a piece of soft chamois skin, and put on the cover, exclaiming, "She is a darling. We have to handle her with gloves."

All the visitors stepped out upon the balcony which surrounds the tower, and obtained a fine view of the coast and sea. They could see two persons near the stern of the "Verbena," who they thought must be Mrs. Cartmell and Miss Gray.



INTERIOR OF A LIGHTHOUSE.

Mr. Cartmell thanked the keeper for his kindness, and they all returned at once to the yacht.

"Now, Papa, you must explain to us about the arrangement of the lantern which we have seen in the lighthouse," said Florence, "for I don't understand it at all."

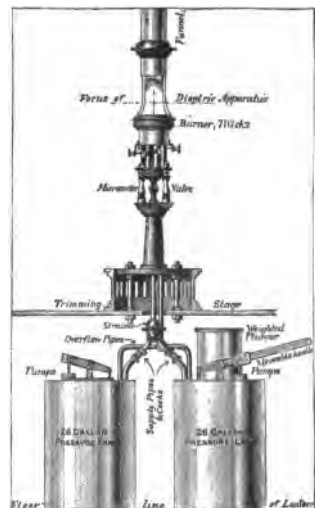
"I will try to, if you and the others will gather round.

"Years and years ago a little boy was born in a small town in France, who was destined to become one of the best friends sailors ever had. When he was eight years old he did not know his letters, because he disliked book-

knowledge. But on the other hand, he was very fond of making experiments, especially in natural philosophy. This kind of study induced his parents to send him to a celebrated school in Paris, where he applied himself so earnestly that he rose step by step till he became an engineer; and soon afterward, in 1819, he won a valuable prize in writing an essay on light."

"Well, Papa, I don't see what this has to do with yonder lighthouse."

"You will soon see, Miss Impatience! This young



LAMP AND OIL SUPPLY.

man's name was Fresnel, and he invented a way to make a lamp to be seen at a great distance from a lighthouse. In the first place he improved the lamp, so that there are four or five concentric wicks, one within the other, supplied with abundance of colza or kerosene oil by a pump moved by machinery, or from a reservoir of oil elevated above the wicks, and able to burn for twelve hours or more without being touched. You all saw this lamp inside the 'lantern.'"

"Why is there so much glass around the lamp?"

"Here is where Fresnel made his greatest invention. The object of that barrel of glass, of so many lenses, is to make all the rays of light going out from the lamp go forth so as to illumine the sea, and not the ground or water at the foot of the lighthouse, or the sky above it.

"This you will understand from a simple drawing of a lamp, and a part of the lenses surrounding it.<sup>1</sup>

"In the figure I am now sketching on this paper, this part represents about one half of the round barrel of glass, cut directly down through, from top to bottom. This gives what is generally called a cross-section. The ends of the lenses, as it were, are shown, and they are triangular in shape. The glass barrel, you remember, was made up of a series of glass rings, or prisms, laid one on top of the other."



LIGHTHOUSE LANTERN.

"I remember how it looked," exclaimed Fred.

"The rays of light from the lamp go out to each of these lenses, as I now show by the dotted lines, and in passing through are bent, or turned from their first direction, so as to emerge in a horizontal direction, and shine out across the water in one broad band of light."

"Do the rays in this way light up that part of the ocean where they are most needed to prevent shipwreck?" Florence asked.

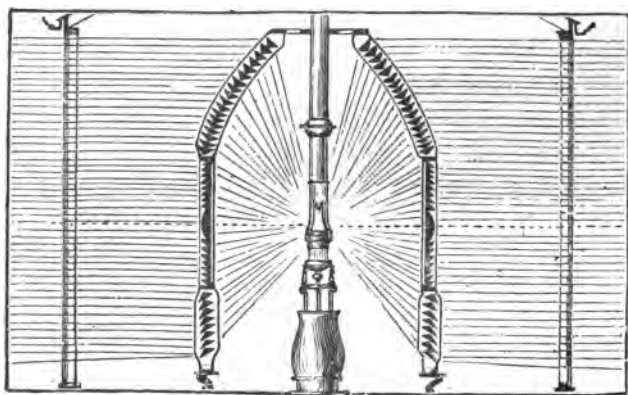
"Yes; the flame of the lamp is about five inches in height;

<sup>1</sup> See cut on the next page.

but this wonderful glass barrel sends forth a band of light eight feet in height, which is frequently seen twenty miles away."

"What a wonderful invention! They ought to call the lens after Mr. Fresnel, who thought it out," said Mrs. Cartmell.

"That is just what the world has done. It is known everywhere as the Fresnel lens. For a fixed light it was perfect. Another gentleman, Mr. Stevenson, made im-



SECTION OF LENS AND LANTERN.

provements in the revolving lights so that the fixed white light would be darkened, then this would be followed by a brilliant white flash, and then the light would go out, and reappear in a few seconds. Sometimes the flash is a red light. Each lighthouse has its characteristic light. The Government prints a catalogue of all the lighthouses, showing the kind of light given out by the lamp. Each vessel always carries this catalogue, and thus a vessel lost

in a storm can usually tell where it is as soon as it can see a lighthouse."

By the time the interesting lesson about the lantern was finished, and all had returned to the upper deck, the "Verbena" had steamed along many a knot, and the party found themselves past the Seguin Island Light. The tower and the other buildings could be seen away to the stern, rising far above the highest point of the little island.

"What are all these schooners, Captain Graham?"

"They are filled with ice, Master Fred. We are opposite the mouth of the Kennebec River, and these vessels are carrying the ice to Philadelphia, Baltimore, and Savannah."

"I remember the big ice-houses we saw on the banks of that river when we took the trip to the Woods of Maine."

A safe and pleasant harbor was presently found by Captain Graham between two islands, near Monhegan Light, to which he piloted the yacht.

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## LESSON XI.

### AMONG THE LIGHTHOUSES.

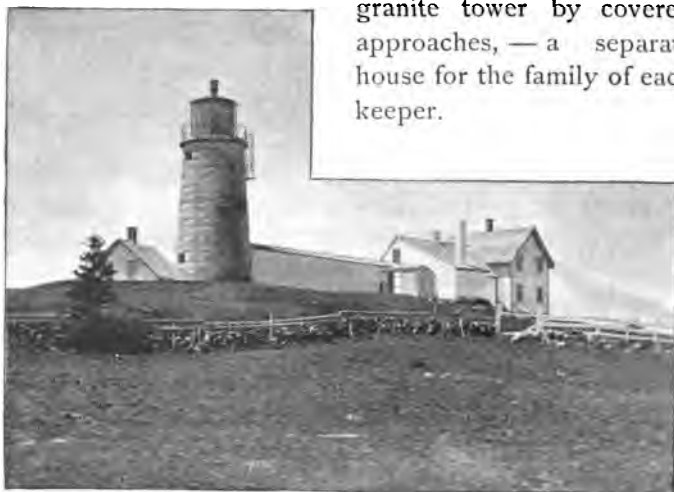
#### *Part II.*

AS soon as they had anchored near Monhegan Light, as described in the last lesson, Fred ran to his sisters, exclaiming, "We are all going ashore before supper. Come."

Mrs. Cartmell and Miss Gray were escorted by the gallant captain, while the children joined their father in the tour of inspection.

After landing they had to climb a steep path and then walk up a long sloping hill before they reached the base of the tower. Here they found two large and comfortable

houses connected with the granite tower by covered approaches, — a separate house for the family of each keeper.



MONHEGAN LIGHT.

From the "lantern" a splendid view was seen. Away to the north rose the hills and woods of Maine; to the south, west, and east stretched the vast ocean. In the harbor lay boats, sloops, schooners, and dearest of all, their palace home, the "Verbena."

"Monhegan," said Captain Graham, "is one of the outside lights, — the Isles of Shoals being another, and Mount Desert Rock and Petit Manan others farther east. These lights are the ones the sailors first see when they approach the coast at night."

The next morning the yacht about half-past seven raised

anchor and slowly steamed out between the two islands and steered toward the mainland.

As the weather was cloudy and cool, Mr. Cartmell proposed that they should try their luck at fishing. John Johns supplied them with lines and bait, and the fun among the children began.

"Here he is!" cried Fred, as he pulled in his line, and a large squid came flying over the side of the boat, at the same time sending forth a stream of inky fluid,—his natural protection against enemies. Some of the ink fell on Nellie's white dress, much to her disgust.

"What horrid creature is that, Papa?"

"He is some relation of the devil-fish I once told you about. We will put this fellow in a glass jar where we can examine him more easily. This queer creature, you see, has a long tapering body with eight or more arms, two of which are very long. Under these arms are two rows of suckers, with which they move or cling to any object."

"Can he move with these arms?"

"Yes, he can swim rapidly backward or forward."

While they were all noticing the beautiful shades of the squid, like mother-of-pearl, Florence asked, "Where is that dog? I can hear him barking. It sounds like Carlo, dear fellow."

All listened, and sure enough it sounded like a dog barking from a closet or some box.

Captain Graham approaching just then, Fred asked where the dog was. The good-natured captain laughed, and led them all to the stern, where the sounds grew more distinct. "Look astern about twenty feet and see." There they saw a queer little brown, shiny object, swimming along and barking for dear life.

"A baby seal!" exclaimed Miss Gray. "Notice how it suddenly disappears, as if pulled down by some superior force."

"There it is again," cried Nellie.

"Watch carefully now," said Miss Gray. After barking for a few minutes, and looking about with evident delight, the seal again disappeared, but not without a struggle. The flippers of its mother could be plainly seen moving under the little fellow. The old



OWL'S HEAD.

seal was apparently afraid of the boat.

As they approached the coast, they met many schooners; some were loaded with lumber, others seemed filled with barrels, and the boys wished to know what was contained inside those barrels.

"Those are lime casts, boys," said Captain Graham,

"from Rockland and vicinity, where lime rock is quarried in abundance and burned."

Then the yacht entered Penobscot Bay and ran into Rockland. This carried them by Owl's Head. George and the others went ashore, the former carrying his beloved camera. He obtained a fine picture of both lighthouse and boat, while the rest of the family climbed the steep steps of the bold rocky headland called Owl's Head, and paid due attention to the lighthouse thereon, and the fine view of Camden and the mountains beyond.

From Owl's Head the "Verbena" proceeded by the nearest route to Mount Desert. As they were crossing the mouth of the bay they soon ran into a fog. This obliged the captain to go ahead carefully. He finally made out Webster Head on the opposite side of the bay. Then in course of time Deer Island loomed up in sight, and they entered the narrow channel south of the latter island, where still greater caution was needed.

Sometimes Captain Graham would stop the boat and listen, and then ring once, to "go ahead," calling out to the "lookout" on the bow, —

"All right ahead, there?"

After passing Swan's Island in safety, a distant whistle was heard; again it sounded much nearer. Quick as lightning the captain struck two bells ("stop"), three bells ("back her"), jingle bell ("as fast as possible"), and the "Verbena" glided backward just in season for all on board to see the great "City of Richmond," loaded with hundreds of travellers, rush by where they were a few moments before.

"Will this fog last much longer, captain?" eagerly inquired Mrs. Cartmell.

"It beats all, madam, how it does hold on; but I expect it will wear off soon."

In a short time after the captain's speech, the yacht entered South West Harbor at Mount Desert, and the fog had completely disappeared. From this point they steamed on along the lovely shore of this Switzerland of America to Bar Harbor, on the eastern side.



BAR HARBOR FROM THIRSTANE  
HILL.

Many yachts were at anchor in the harbor, steamers were coming and going, parties were rowing among the islands opposite, and life seemed happy and gay.

The Cartmells left the "Verbena" in the tender, and from the wharf rode to the Grand Central Hotel, where they spent the night. It was a happy change from the delights of yachting to be once more on *terra firma*.

"Where are we going to-day?" Florence inquired of her father at the breakfast-table.

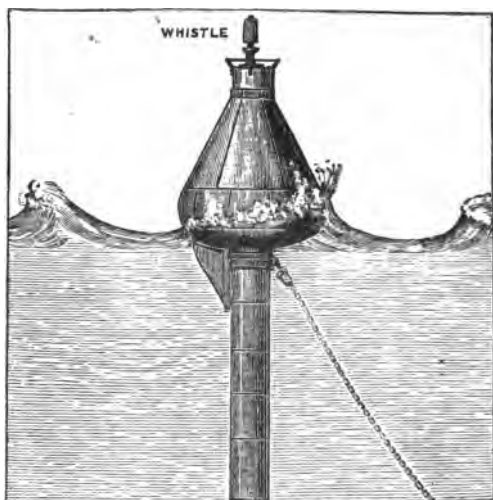
"Which do you prefer, a land or a water trip?"

"I prefer the land for a change."

"Do you all agree?"

"Yes, yes!"

"We will then ride about the village first, go up Thirstane Hill to get a near view of the harbor and the islands, and then ride over to Eagle Lake."



WHISTLING BUOY.

This programme was accepted with satisfaction, and carried out before dinner. The next day the trip was resumed eastward.

While sailing along the coast, the children asked Captain Graham, "Will you please tell us something about buoys?"

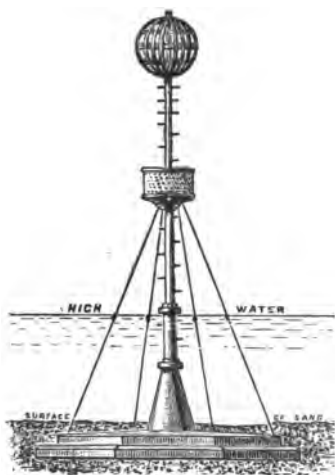
"The government has about two thousand lighthouses; but they are n't enough to indicate all the places of danger,

so buoys are usually placed to indicate a reef, stone, or ledge, which is more or less under water.

"A buoy is generally a floating frame-work of iron or wood, with or without a bell, and painted various colors. They are kept in their positions by stout cables and a heavy anchor, which is usually a great stone. Some of the smaller buoys look like a great barrel."

"How does the whistling buoy work, captain?" George asked.

"I will try to explain. I saw one put down once. There is a picture of one in this book. You can all look at it. There is a long tube going down into the water about thirty feet; it is open at the bottom, and the water comes in freely. The waves carry the buoy and tube up and down. When it goes up, the air rushes in through valves into the part of the tube



BEACON.

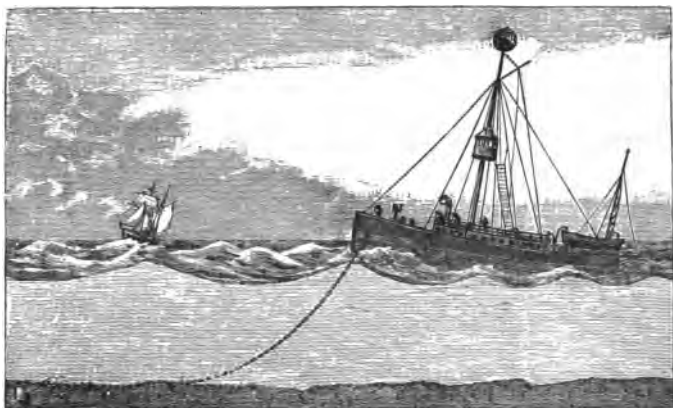
above the water, and when the buoy sinks, the air is forced out through a pipe connected with the whistle at the top. You can hear the whistle we just passed now, and we are about four miles away."

"What do they call a sea-mark if it is fixed on the bottom so as not to move?" inquired George.

"That's a beacon. They are made of iron or stone, and not lighted at night. There are a great many round our coast."

"What do they do when there is no chance to build a lighthouse, and yet a light is needed?"

"Sometimes light-ships are moored over or near sand banks to warn passing vessels. There are a number around the New England shores. They are built of wood and strongly anchored. They display a light every night,



LIGHT-SHIP.

and of course must have a crew on board, to take care of it and the ship."

"How monotonous it must be to live month after month on board of a ship which never moves on!"

"Yes; it must be. So the government relieves half of the crew every month for a four weeks' stay on land."

Entertained by the captain's conversation, the children enjoyed their trip every day. At last they came near to Petit Manan Island, and saw the tall gray tower pointing skyward from the highest point on the barren isle.

"Well, it does not look very attractive," said Florence.

"I am so glad that I do n't live in a lighthouse."

"Home is home, be it ever so humble," said the captain.

"I knew a family once who had lived for several years in a lighthouse situated in a more lonely spot than yonder



PETIT MANAN LIGHT.

island, and when they moved to a busy village on the mainland, they all were so homesick that nothing would satisfy the wife and children till the husband got another position as keeper of a lonely lighthouse."

Captain Graham was now directed to sail for Newport. On the way back Mr. Cartmell at different times told the children about some of the characteristics of lighthouses.

"If all lighthouses exhibited the same kind of a light, and were at the same elevation, it would lead to confusion. A

sailor when he saw a light would not be sure which one of several lights thereabouts it might be.

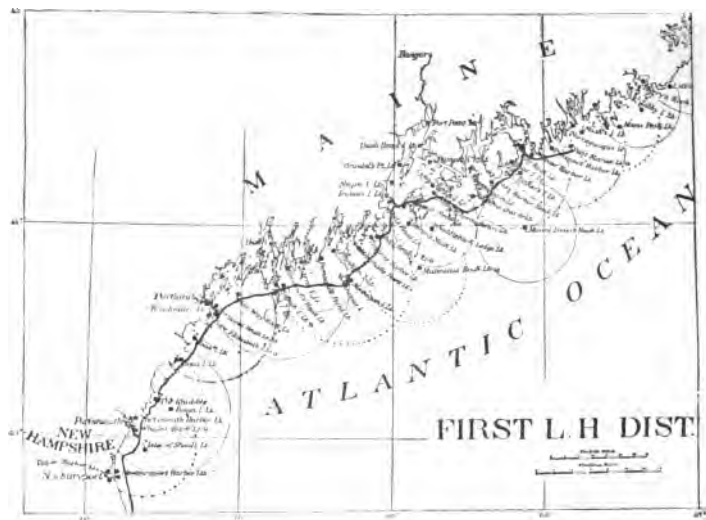
"There are several ways of overcoming this difficulty. One way is to have a different number of lights at neighboring stations. For instance, on Little Brewster Island, Boston Harbor, there is one light; at Plymouth, there are two; at the Gurnets, on the east side of Cape Cod, there are three lights.

"Another way and more effective is to change the colors of the lights, and make them fixed or flashing, or a combination of the two. The colors generally used are red and white; the former penetrates fogs better than other colors. These lights can be arranged so as to show a fixed white light, a fixed white varied by white flashes, or a fixed white varied by red and white flashes. The flashing lights can be changed so as to flash at different intervals. The light at Gay Head, on the western point of Martha's Vineyard, flashes every ten seconds, white and red, the fourth flash only being red; Boston light flashes white every thirty seconds; Chatham harbor has two fixed bright lights; Samkaty Head, Nantucket, has one fixed and one flash light. Provincetown Harbor has one flash red light, every fifteen seconds.

"Lighthouses are made as conspicuous in the daytime as possible by their shape or color. If the background is dark, they are painted white; when the background is light, the towers are left their natural color. The Gay Head tower is red; West Quoddy, Maine, has alternate white and red horizontal stripes; at Cape Hatteras the tower is colored in belts of black and white; the St. Augustine tower has black and white spiral bands; Mount Desert has a gray tower; Cape May, a straw colored

tower, and Sable Island, Nova Scotia, an octagonal tower."

George drew a map on the homeward journey, showing his sisters very clearly the route over which they had just sailed. He read the reports of the United States Light-



THE ROUTE OF THE "VERBENA."

house Board, and contributed the following interesting facts: —

"The United States is divided into sixteen lighthouse districts. The first is along the coast of Maine; the second to the sixth inclusive comprises the Atlantic Coast; the seventh and eighth, the coast of Florida and Gulf of Mexico; other districts lie along the Pacific coast, the Great Lakes, and the great rivers.

"Each district has a naval officer as inspector, who has

charge of the supplies for the light stations, salaries of the keepers, etc. In these sixteen districts are two thousand lights, but a less number of lighthouses, maintained at a cost annually of one and a half million dollars. The principal keepers of the first-order lights receive one thousand dollars a year salary; there is only one on the Atlantic coast who receives this sum, and he lives at Minot's Ledge."

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## LESSON XII.

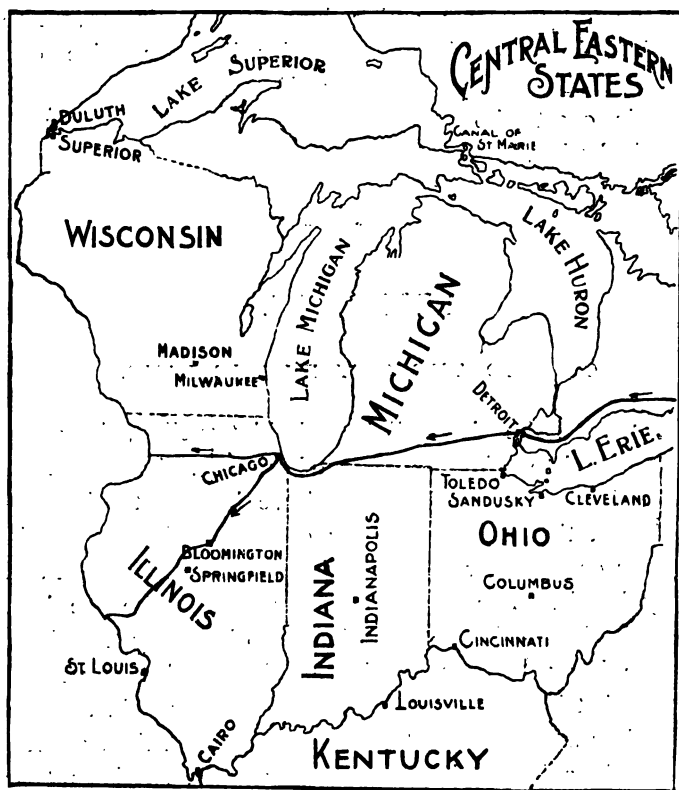
### CHICAGO, THE CITY BY THE LAKE.

THE more the Cartmell household travelled, the more they seemed to enjoy a change of scenery. They had all travelled enough by this time to have learned the important lesson that home comforts cannot be found even in Pullman coaches, or on palatial steamers, or in great and costly hotels. The happy traveller must make the best of everything, and not allow himself to be easily troubled.

Lake View never seemed more beautiful than it did after their trip among the lighthouses, and yet in about a week they were all ready to close the house for the summer, and begin a longer journey than even the southern tour previously described.

The lake metropolis of **Chicago** was the first objective point this time. It was reached in twenty-seven hours by the Boston and Albany, New York Central, and Michigan Central Railroads. This is often called "the Niagara Falls Route," because quite a good view of the celebrated fal'

is obtained from the windows of the train. This route passes through Detroit, which is said to be one of the most



MAP OF CENTRAL STATES.

beautiful cities in this country. Very little of its beauty, however, can be seen from the train.

The first evening in Chicago was principally spent by the Cartmells in studying the general character and plan

of Chicago from the map, and in laying plans for the next day.

"Chicago, I suppose," said Mr. Cartmell, "has grown to a vast city of over one million inhabitants in a shorter time than any other city of the same size, in the world. At the present rate of increase it will soon become the metropolis of the western world. The growth of the city is limited on one side by the lake, but in the other directions it may expand indefinitely. The Chicago River divides the city into three parts, which are generally known as the North Side, the South Side, and the West Side."

Mr. Cartmell drove his family through a part of La Salle, State, Clark, and Dearborn Streets; they also rode on the cross streets, Lake, Washington, and Madison, all of which are comprised in the central business portion of the great city. They noticed that the city is very regularly laid out. The streets are wide, and run north and south, east and west, crossing each other at right angles. The active, bustling character of the streets was very striking; on State Street, in the business part of the city, the noise and hurry of the cable cars, and the busy crowds of people, gave them a very good idea of this stirring, wide-awake place.

As they went about they found the public and business buildings were magnificent. Many of the more recent ones are built very high; ten stories is not now considered in this city unusual, where the "sky-scrapers," as they call them, frequently reach fourteen stories, and the new Masonic Temple will be over twenty stories. In these tall buildings the actual edifice is frequently made of a steel frame-work, to which are added thin outer walls of brick or stone.

One of the buildings they visited was the Auditorium. This immense granite structure represents some of the modern ideas of a building. It is at once a grand opera house capable of seating four thousand people; a great



AUDITORIUM, CHICAGO.

hotel with four hundred guest rooms; and a mammoth office-building, containing numerous stores and scores of offices, many of which are in the tower.

Mr. Cartmell and his family ascended in the elevator to eighteen stories, and then walked up one story to reach the top of the tower.

"How high up are we, Papa?" Nellie inquired.

"The top of the lantern tower occupied by the Weather Bureau, a few feet above where we stand, is two hundred and seventy feet."

The views from this great elevation were varied and interesting, except where they were cut off by clouds of smoke toward the west. Lake Michigan was spread out at their feet; the streets ran out in different directions so far below that the cable cars looked like toy carriages; and even the fourteen story buildings did not seem to be in any danger of scraping the sky.

Leaving this building, our visiting friends rode about the business part of the city for another hour, and then left their carriage to visit the interior of a very tall and graceful building known as the new Chamber of Commerce, on La Salle Street. After entering the building, and reaching the centre of the first floor, Mr. Cartmell asked the others to look upward. They saw twelve balconies with their bronze railings rise in perfect symmetry above them. Away at the top is an immense sky-light of plate glass. Through this great window plenty of light falls upon the central court, making the interior almost as light as the outside.

"Notice, children," said their father, "that not a post or a pillar is visible along the sides of the twelve balconies. They are all supported, like parts of iron bridges, on the *cantilever* principle."

Mr. Cartmell led his family into one of the express elevators, and in one minute and a quarter they were looking down from the twelfth balcony upon the people in the court below. Every story is finished in Italian marble and beautiful mosaic. It is a busy place; this building is almost a city in itself. Every branch of commerce and

nearly every profession is represented here. It is called by many one of the finest business buildings in the world.

"I suppose," said Miss Gray, "there are more people doing business here than in a good-sized city in New England. In some of these great office buildings four thousand persons do business under one roof."



EXCHANGE HALL, CHICAGO.

A short walk down La Salle Street from the above building brought the Cartmells to the Board of Trade Building, which is celebrated for its great size and beauty. The tower is very graceful, and tapers to a point three hundred and twenty-two feet above the pavement. It has on the top the largest weather-vane in the world, a lake schooner fifteen feet long.

Mr. Cartmell escorted his party within and upstairs into the gallery of Exchange Hall, which is large enough to

hold any five-story block of buildings in the city. This room is finely decorated. From the gallery they could see hundreds of men standing in and around the "pits," shouting and yelling, pushing and crowding, throwing up their arms and pointing with the index finger, rushing about as if half crazy. Some of them wore their hats, some were in their shirt-sleeves, all seemed busy and anxious. Telegraph and messenger boys crossed and re-crossed the hall, ran from one pit to the other, or to the men who sat at the tables with little cups of grain before them.

"Are these men half crazy?" inquired Florence.

"They are only 'bears and bulls,'" replied George.

"What in the world are they doing?"

"They are buying and selling grain; they are transacting business up to millions of dollars with a lead pencil and a little piece of paper. Notice that most of the men are young men not over thirty years of age."

One day Mr. Cartmell and the boys went to the Union Stock-Yards, riding southward on the cable cars as far as Thirty-fifth Street and then transferring to a cross line and going a short distance to the west. The cable cars are propelled by a steel wire cable, which moves rapidly under the street and is grasped by iron clasps which pass down from the car, and which are easily managed by the driver. These cars run nine miles an hour in the crowded parts of the city and thirteen miles farther out. They run in trains of two or three cars, and are far inferior, the Cartmell boys thought, in comfort and elegance to the electric cars of Boston.

The yards are some five miles from the Palmer House. When this place was first selected for the business, it seemed

to be so far away ; but now the yards are almost in the centre of the city, so great has been the growth of this western metropolis.



UNION STOCK-YARDS.

Leaving the cars, the boys and their father walked along Packers Avenue, leading into Packing Town. Pens for cattle were to be seen on each side ; some of them were open, others were covered. The cattle were out doors, and the sheep and calves were under cover. The cattle-pens were of different sizes, holding from two cows to three hundred head. Each pen is supplied with watering and feeding troughs.

"There are," said Mr. Cartmell, "over two hundred acres of these yards, and almost as much ground taken up with the railroad tracks and car sidings. There are twenty-five miles of these watering troughs, fifty miles of feeding troughs, and seventy-five miles of water and drainage pipes."

"Where do they get water for the cattle to drink?" George asked.

"Largely from artesian wells, I believe."

As they were passing along toward the slaughter and packing establishment of Armour and Company, a drove of cattle came rushing past. Men on horseback with small whips directed the herd through the different streets to pens in other parts of the yards. Soon after they saw a large number passing through viaducts, or an elevated passageway over the pens of the cattle.

"Where do you suppose those cattle are going, Father?" Fred inquired.

"I presume to the building where they are to be killed."

Mr. Cartmell now engaged a guide to show them as quickly as possible the sights of the cattle-yards.

He took them first to the great slaughter-houses and showed them the details of the business from first to last. All the work here is done by experts, each one having a single division of labor to do. "There is not," he said, "a single part of the creature which is not used for some purpose, and which does not have a money value."

"Are the blood and hoofs of any value?"

"Certainly. Both are saved, and sold as fast as produced for commercial purposes."

"When do the cattle arrive, Mr. Guide?"

"They come here on the railroads from the West and South, reaching this place each morning between four and eight o'clock. The buying and selling take place mostly in the forenoon. The cattle to be killed remain in the pens till the following day."

"How many cattle are received here each day?"

"The average is about ten thousand."

“What firm does the most business?”

“Probably Armour and Company. They killed last year one and a half million hogs, three fifths of a million cattle, and over three tenths of a million sheep. This firm employs seven thousand men, and uses nearly two thousand refrigerator cars in carrying their products to the eastern markets. Their immense business is shown when I tell you that their buildings in this place cover fifty acres.”

Dismissing their guide, the Cartmells entered the restaurant in the Exchange building, and dined with the great cattle-men, butchers, drivers, and packers. These men were not acquainted with all the graces of refined society; more than half of them ate with their hats on, without napkins, and frequently used their knives to carry food to the mouth; but they had good appetites, strong constitutions, and apparently owed no man a dollar.

On the way back to the city George reminded Fred of the day when they saw in St. Johnsbury, Vermont, the Boston meat-train of refrigerator cars which came from these Chicago stock-yards.

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#### A REVIEW.

1. Where did the Cartmells go when they sailed “Along the Shore”?
2. Describe a lighthouse.
3. Tell about the lantern.
4. Where is Monhegan Light?
5. What is a whistling buoy?
6. What is a light-ship?
7. Describe a visit to Chicago.



PULLMAN, ILLINOIS.

## LESSON XIII.

### PULLMAN, PARKS, AND GRAINS.

THE same day in which Mr. Cartmell and the boys went to the Stock-Yards, Mrs. Cartmell, Miss Gray, and the girls took a trip to **Pullman**, the celebrated town where the Pullman cars are made.

In the evening the boys told of what they had seen, and then Fred asked, —

“Mother, what did you see in Pullman?”

“Pullman is an interesting suburb, not matched, it is said, anywhere the world over. It is a village of about ten thousand inhabitants, built exclusively by the Pullmans for their laborers, and having all the distinctive features of a long-established and flourishing town. Cars of every description are made here, the shops having a capacity for turning out each week three sleepers, ten passenger cars, two hundred and forty freight cars, and several street cars,

the number depending upon the value of the cars. The houses are built in blocks, of brick, about three stories high, and the main street of the little village has a park and a



TOWER AND SHOPS IN PULLMAN.

pond. There is no liquor selling, and the place is neatly kept, and we saw some of the people taking their noonday meal sitting on the banks of the little lake. There is a beautiful stone English church; and in the Arcade, a pretty

building, there are three churches and a theatre. There are many Scandinavians among the laborers, and one of the Arcade churches is for them, with service in their language. There are the library, a handsome drug-store, a narrow street-car track, — all that goes usually to make up



MICHIGAN AVENUE BOULEVARD.

the privilege of a much larger town, and all within a short distance of space, for the people."

"Did you find any schools there, Mother?" Fred asked.

"There are several good schools, employing over twenty teachers."

"How many jails do they have?" Mr. Cartmell asked.

"Not any."

"How many policemen are employed?"

"Only two."

"How many paupers do they have?"

"None."

"What did you learn about the amount of crime?"

"They do not have any."

"Why?"

"Because the people are all industrious and temperate."

"We have seen," said Mr. Cartmell, at the breakfast table, "the business part of Chicago. Suppose we spend one day at least among the **parks and boulevards**."

"That will be delightful!" Nellie exclaimed; and the others agreed with her.

"Few cities in the world," continued Mr. Cartmell, "have a larger and better arranged park system than Chicago. There are six large parks, four medium sized ones, and a number of small squares. The six large parks are scattered about the city, and connected with one another by wide streets called boulevards. The length of the latter now reaches fifty miles."

Directly after breakfast the Cartmells drove from the Palmer House southward along Michigan Avenue Boulevard. This fine street skirts at first the Lake Front Park, and affords a pleasing view of the lake. Some of the finest hotels in the city are situated on this street.

The avenue was found to be about one hundred feet wide from curb to curb. The roadway was as level as the top of a billiard table, and the pavement hard and well-kept. Stately and elegant residences with handsome lawns and wide spreading trees are on either side.

"This avenue," said Mr. Cartmell, "is not as famous for residences as formerly, yet noted merchants, lawyers, and editors live in these beautiful houses."

Madison Avenue finally came to an end; but a wider, grander street was still before them, running southward. The name was changed to Grand Boulevard, and the width of the street was doubled. As they rode along under the



JACKSON PARK.

double rows of elms, the children frequently exclaimed, "How grand!" "How beautiful!"

Following this avenue they soon came to Washington Park. In this park they admired the famous "Meadow," which is a stretch of well-kept sward covering one hundred acres; also the "Mere," a sparkling lake behind long lines of oaks and elms; but they enjoyed most the exhibition of landscape gardening, in which flowers and foliage are trained to form pictures and designs.

A short ride from Washington Park toward the lake brought the Cartmells to Jackson Park, another of the South Parks, and the largest of all the pleasure resorts. It

is about eight miles south of City Hall, and lies along the shore of Lake Michigan. Mr. Cartmell and his family rode for some time under the overarching trees, and admired the flowers and shrubbery. When they reached the part near the lake, the carriage was left for a change, and each one enjoyed a walk beside the restless water.



LINCOLN PARK, CHICAGO.

Returning to the carriage, they rode half a mile farther south than the sea walk shown in the picture, and there they saw the locality for the "World's Columbian Exposition."

On the way back to the city the conversation naturally related to the great Fair, its extent, historical importance, and value. Passing through Drexel Boulevard, the wonder of old and young was more than satisfied by the grandeur

of this double driveway. Through the centre was a wide strip of green sward, interspersed with shrubs, and flowerbeds of beautiful design and richest color. Many of the finest mansions and villas of Chicago are to be seen on each side of this avenue.

In the afternoon the family rode on the north side along Lake Shore Drive toward Lincoln Park. This drive at one part is carried through the edge of the lake, affording a fine view of the water on both sides, with the park and some part of the city not far away. This park is more fully advanced than the other parks. Mr. Cartmell drove leisurely about, stopping to see the attractions whenever the children asked him. The Lincoln, Grant, and Indian monuments were carefully viewed. The palm-house, sixty feet high, was greatly admired by the ladies, and the lily ponds delighted every one. Miss Gray, however, became unusually enthusiastic over the great victoria, whose leaves are over three feet in diameter and whose blossom is nearly a foot across.

At another time Mr. Cartmell took the children out on the North Western Line across the northern part of Illinois, directly west from Chicago, in order to see some of the **grain**-producing operations of the West. After riding some twenty miles from the city, they began to see fields of waving wheat and bright green corn.

"How pretty it is!" exclaimed Florence.

"So beautiful," replied her father, "that it has been used by artists and architects in their designs, and so precious that the wheat fields of our country are worth more than its gold mines."

"Worth more than gold!" repeated Nellie. "Why, I thought that was the most valuable thing there was!"

“No, the mines are very rich; but California, which has the richest, is better known as an agricultural than as a mining State, and annually produces and sends away great quantities of flour. If the six great products of the United States are arranged according to their value, we have three pairs, — the first of which, flour and meat, gives us food; the second, lumber and iron, furnishes buildings; and the last, cotton and woollen cloth, provides our clothing.”



THRESHING.

“Don't they need a perfect army of men to care for such great farms?” inquired Florence.

“No,” replied Mr. Cartmell, “new machines have been invented and old ones improved, so that now the work is done by horse or steam power, and one man in charge of a machine can do the work that used to require half a dozen or more. Take for example the harvesting: a machine reaps the wheat and binds it into sheaves; it is carried to the steam thresher, which has been brought to

the field, and there threshed and freed from the chaff. In some places, instead of reaping, a "header" is used which cuts the grain, drops it into a great box on the machine, and leaves the straw standing."

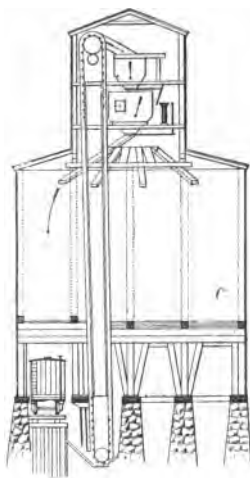
While this conversation was going on, the children were looking out of the window, and soon discovered that the great reapers were actually at work in many of the wheat fields. They are drawn by four to six horses or mules, and they cut the wheat and bind it up. Other men follow the machine and stack the wheat that it may ripen and dry. A few weeks later it is threshed in the fields by powerful steam threshing-machines.

"In what States is wheat now principally raised?"

"Wheat is raised in nearly all the States, and there are grist mills in all; but the business is becoming more and more a western one."

"I was surprised," remarked Miss Gray, "to learn how rapidly it is becoming so. In the year 1850 half of the wheat crop was raised on the Atlantic Slope; thirty-five years later, half the crop was grown beyond the Mississippi, and only one twentieth in the Atlantic States, although the quantity raised there had increased somewhat."

"The great wheat growing States," said Mr. Cartmell, "are the Dakotas, Minnesota, California, Kansas, Indiana, Ohio, Iowa, Michigan, Illinois, and Missouri. The four great centres for the distribution of this wheat are Chicago,



GRAIN ELEVATOR.

Milwaukee, St. Louis, and Minneapolis. The last two have great mills for making flour from the wheat. One of the largest mills in the latter city turns out seventy-two hundred barrels of flour in a day, and the whole city forty thousand barrels."

On this trip they noticed how level the land was, and that fields of corn seemed to alternate with those of wheat. The corn was about two feet high, and in many cases the farmers were running a cultivator between the rows to stir up the ground and kill the weeds.

"The great corn States," said Mr. Cartmell, "are Iowa, Illinois, Kansas, Nebraska, Missouri, Ohio, and Indiana."

On their way back to Chicago in the afternoon, Mr. Cartmell amused the children by explaining with words and drawings how grain is handled in large quantities in the great elevators.

First Mr. Cartmell drew a sketch of the inside of a great elevator as seen in Boston, New York, Buffalo, or Chicago. "The grain is shovelled out of the car into the bin far below called a sink, whence it is taken up by the elevator buckets into the garner in the top story. These elevator belts travel at a speed of four hundred and fifty feet per minute, carrying up about one hundred bushels in that time. A railway car holds about four hundred bushels, and it can be emptied in a few minutes. From the garner bin, the grain passes into the scale-hopper, where it is weighed, and then is conducted into any one of the twelve or more bins in the building, from which it flows into cars or ships that carry it away."

## LESSON XIV.

### DOMESTIC COMMERCE.<sup>1</sup>

"WHEN we were in New York," Mr. Cartmell remarked one evening after the trips about Chicago, recorded in the last lessons, "we had a long talk about foreign commerce. (See Lesson XIX., in Part I.) We ought to consider *domestic commerce* now, as we are in this great inland commercial centre."

The children were eager to learn about this subject, and so expressed themselves. Their father, therefore, continued:—

"Great and important as our foreign commerce is, our domestic commerce is much vaster. No other country can equal us in this respect. Let us discuss first the *means of carrying it on*. How are things carried, Nellie?"

"By the railroads."

"Yes. In what other way, Fred?"

"By steamers and ships along the coast, and through the rivers."

"Is there a third way?"

"By boats through canals," said George.

"Please look at this railroad map, George, and name some of the trunk lines in the eastern part of the United States."

<sup>1</sup> The places mentioned in this chapter should be looked up by the children on the different maps.

"I see on the map the *Grand Trunk* line from Portland through Canada; the *Boston and Albany*, and the *Hoosac Tunnel* routes across Massachusetts and New York (the name is of course changed in the latter State to *New York Central*); the *New York and Erie* Road to Buffalo and the West. The *Pennsylvania* Road from Jersey City to Philadelphia and Pittsburg and the West; the *Baltimore and Ohio* Railroad, which runs westward through the Potomac Valley; and farther south, the *Norfolk and Western* and the *Central Georgia* railroads."

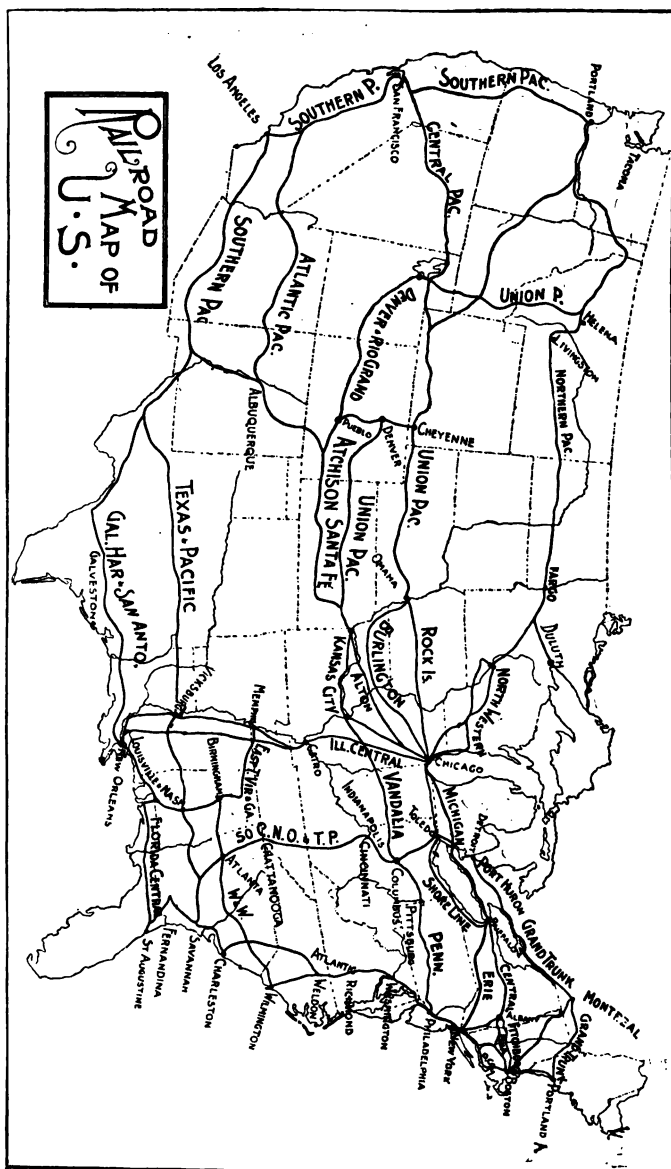
"Notice, children, that all these great routes run east and west. Connected with them in the central part of the country, you will see a perfect network of railroads. Some of the most important of these are: the *Chicago and Northwestern*, the *Acton*, the *Chicago, Burlington, and Quincy*, the *Atchison, Topeka, and Santa Fé*, the *Missouri-Pacific*, and the *Illinois Central*. Most of these roads run westward, except the last, which runs exactly south from Chicago to New Orleans. What railroads connect these with the Pacific coast?"

Fred replied, "The *Northern Pacific* from St. Paul, the *Union Pacific* from Council Bluffs—"

"This was the first railroad built across the Rocky Mountains," remarked Mr. Cartmell.

"The *Atlantic and Pacific*, now a part of the *Santa Fé* route, from Chicago, Kansas City, and Albuquerque; and the *Southern Pacific* from New Orleans."

"These great trunk lines," said Mr. Cartmell, "with their connections, interlace the surface of this country with iron bands, affording an outlet for the products of every section. As more of these great railroads start from this city of Chicago than from any other in the world, the conve-



nience of this place for studying domestic commerce is very great.

"The subject of railroads is so vast, we will take it up again at another time, and now go on to consider the second method of carrying on domestic commerce, — by means of steamers and ships. Who can tell me something about this topic?"

"I know," said George, "that lines of steamers run from Boston to Portland, to New York through Long Island Sound, to Philadelphia, and to Savannah."

"There are," said Miss Gray, "a number of lines of steamers from New York to places along the coast, such as New Bedford, Providence, Newport, Baltimore, Norfolk, Richmond, Charleston, Savannah, Fernandina, Havana, Kingston, New Orleans, Galveston, and Vera Cruz. Whatever is produced in these cities or in the sections of the country represented by them, is carried by these steamers to New York. Three fourths of the vessels in the United States are engaged in the coastwise trade."

"I know some of the rivers noted for domestic commerce," said Florence.

"Please name them."

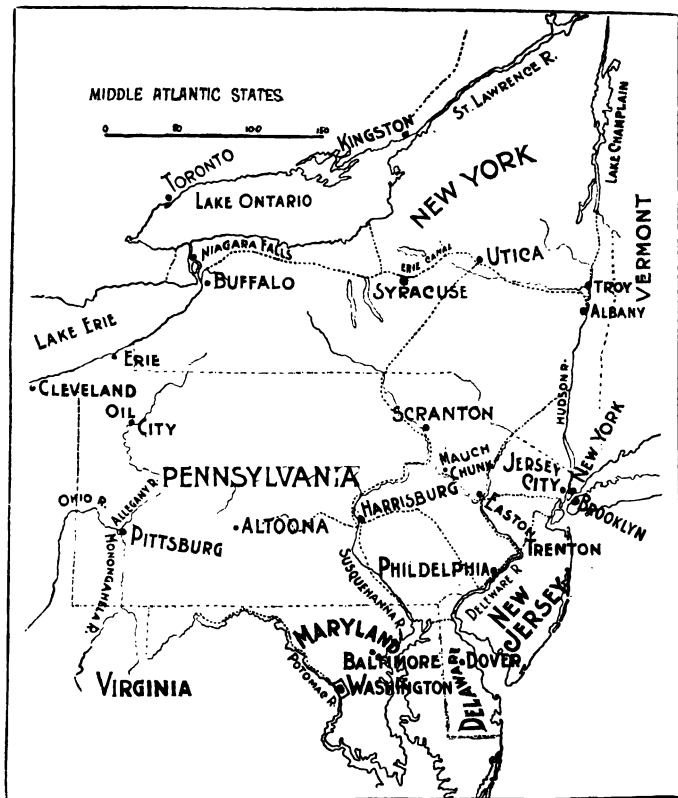
"The Hudson, the Delaware, the James, the Savannah, and the mighty Mississippi and its tributaries, fifty-four of which are navigable for steamers."

"I have read," said Miss Gray, "that there are two thousand or more steamers continually moving up and down the Mississippi and its branches. Fred, can you tell us anything about the canal system of this country?"

"I have a map here which shows most of the important canals. I did n't know there were so many."

"If you will look at Fred's map, I will point out one of

the most important of these artificial water-ways. The Erie Canal, through the centre of New York State, is the oldest



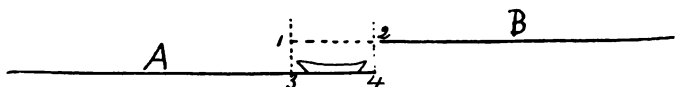
IMPORTANT CANALS SHOWN BY DOTTED LINES.

and the most important. It furnishes cheap transportation for the products of central and western New York, and for grain and other products around the great lakes. There are about two thousand boats on the canal, and it

contains seventy-three locks. The round trip between New York and Buffalo consumes a month."

"You said something, Papa, about a canal having locks; what do you mean?"

"That is a good question, little girl. A lock is a means of lifting a canal boat from one level to another. It has to be used when there are changes from a flat and level



country. Suppose A represents one level of a canal, and B another. A canal boat passes through A and enters 3 4, which is as far as it can go. The gates at 1 3 are closed behind the boat, and the water in B is allowed to flow into 3 4 till it lifts the boat to 1 2; then the gate at 2 is opened and the boat is drawn by the mules through B. I have in my hand a picture of three double locks on the Erie Canal, at Lockport, N. Y. A boat is just ready to leave the lock on the right.

"Let us now consider, children, some of the noted centres of trade connected with domestic commerce. For convenience we will group them, and mention first half a dozen seaports."

"The same places," said Miss Gray, "which were noted for foreign commerce are likely to be important in domestic commerce, for the one is greatly dependent upon the other."

"I will then mention New York first," said Nellie.

"You are right, Nellie. The Erie Canal and the railroads which centre there, all doing an immense business each year, and the great amount of manufacturing in and



LOCKS AT LOCKPORT, N. Y.

around the city, have built up an enormous amount of domestic commerce."

"We saw a good deal of these industries when we were there," said George.

"I should think Boston would come next among the seaports."

"It does, if you consider both kinds of commerce; and as it is the metropolis of New England, it has a great

amount of business with this whole section. A number of great railroads move goods to and from this city. The products from the West reach Boston largely over the New York Central and the Boston and Albany railways."

"Philadelphia must have considerable domestic commerce," said Florence.

"Yes, it has on account of its being so near the coal and iron mines, and as supplying the needs of New York and other centres with carpets, pressed bricks, and iron and steel manufacturies.

"New Orleans has an immense business with the Mississippi Valley and the Gulf States in cotton, cotton-seed, sugar, and rice. San Francisco is another seaport which has considerable inland and coastwise commerce. Steamship lines connect this commercial centre on the Pacific with the towns along the coast, and railroads connect it with important places inland."

"Now," said Mr. Cartmell, "name seven noted river ports."

"Pittsburg, Cincinnati, Louisville, Kansas City, St. Paul, Minneapolis, and St. Louis."

"What has built up the first one mentioned?"

"Coal and iron mines."

"Cincinnati was once the great pork-packing city, but other industries have recently diminished this business. This city still remains the metropolis of the Ohio Valley. Louisville is the greatest tobacco-market in the world. Kansas City, in Missouri, has both railroads and the river to build up its commerce. It is so near the cattle ranges that it has a great traffic in dressed beef and in meat-packing. In this respect it stands next to Chicago.

"What are the twin cities noted for?"

"The former, St. Paul, for its miscellaneous manufacturing and railroad business," said George; "the latter, Minneapolis, for its flour-milling products. It now makes forty thousand barrels of flour in a day."

"We have not yet mentioned all the important centres for domestic commerce in this country. What others are there?"



THE ERIE CANAL, BUFFALO, FROZEN OVER IN WINTER.

"Those situated on *lakes*, like Chicago," Fred replied.

"Have we passed through any of these lake ports?"

"We went through Buffalo when we came to this city," said George. "It is situated at the foot of Lake Erie, and it is an important railroad centre; twenty railways run to this city. The grain sent eastward is trans-shipped in this city from the lake schooners and steamers to the canal boats and trunk railway lines. Grain is received, trans-

ferred, stored, or forwarded more quickly than at any other port in the country. Five large steamer lines, owning sixty vessels, ply between this port and others on the lakes.

"Lake Erie," said Miss Gray, "has a number of other active lake ports. Cleveland, on the southern shore of this



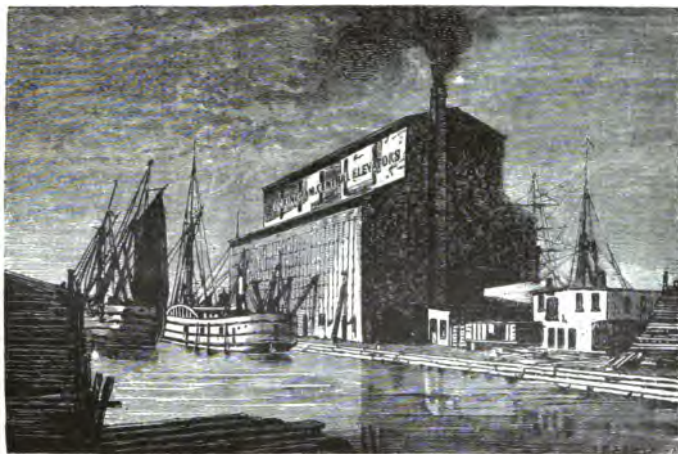
WELLS STREET BRIDGE, CHICAGO RIVER.

lake, is the largest of these places. It has a large shipping trade in grain, iron ore, and manufactured products. The Ohio Canal connects the lake with the Ohio River, and numerous railroads connect the city with the West and East. Beautiful lake steamers are also built here."

"Toledo and Detroit," said Miss Gray, "must not be omitted in your list."

"Chicago," said Mr. Cartmell, "is the largest of these lake ports, and equal in size and business to all the others mentioned. It is favorably situated for domestic commerce, being so near the corn and wheat belts, at the end

of a chain of great lakes, fed by twenty-five railroads, in the northern centre of the Mississippi and Ohio Valleys, surrounded by great mineral deposits, and able to get coal at cheap rates. This city is the natural business centre for one thousand miles round about, and for twenty-



ELEVATOR, CHICAGO.

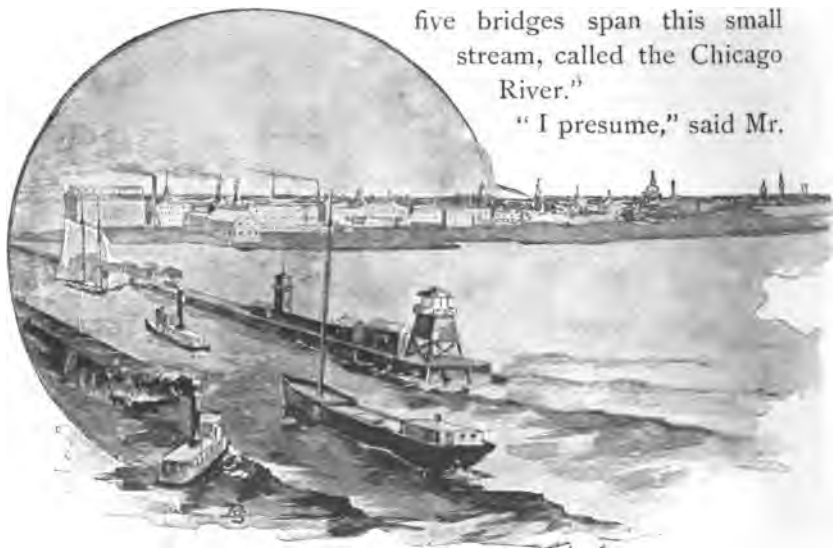
five million people. As in London we find men whose business field is the world, so in Chicago we find men who do business with the entire country, and talk with equal readiness about the South, the West, and the East."

"In our ride about the city yesterday," said Miss Gray, "we passed through several streets in the crowded business section on the 'South Side,' where we saw the rush and hurry of these merchants you have just mentioned. Sitting in the carriage near the Wells Street Bridge, we witnessed a characteristic scene, when the bridge quickly

swung round and admitted up the river an immense grain schooner, with four masts, which had just come to the city from the lakes.

"This ship was drawn by a powerful tug, and passed through several other draws before it reached the nearest grain elevator. No less than forty-five bridges span this small stream, called the Chicago River."

"I presume," said Mr.



MILWAUKEE.

Cartmell, "it would be a very interesting ride up the river on one of those tugs. You would come to lumber-yards beyond the elevators, for great quantities of lumber are brought here from the North, and sent away to the new towns and villages that are springing up so rapidly in these central States. The shipping of Chicago is second only to that of New York. The stranger is astonished at the number of vessels seen here."

"One strange thing about the river," said George, "is that it flows backwards."

"Flows backwards!" exclaimed Nellie; "how can it do that?"

"It was first connected with the Illinois River by a canal; then its channel was deepened so that it was lower than the lake, and water running in from that reverses the current, and carries the sewage of the city toward the Mississippi."

"Chicago," continued Mr. Cartmell, "has become the third manufacturing city of the country. One day a stove-making concern in the East moves to Chicago; the next day a boot and shoe company follows suit. Chicago now makes all the common kind of shoes she needs. But she shows the greatest advance in her present manufacture of iron and steel. There are in the city a large number of rolling mills, founderies, machinery and boiler works. Ship building, too, is becoming important. A fine large steel steamer was launched a year ago, to be used in the lake trade."

"A few miles north of Chicago," said George, "is one more lake port, Milwaukee, which is as large as Detroit. The great industries are iron and steel working, and the brewing of malt liquors. The business centre is in the heart of the city along two small streams. The mills are situated on a ship canal, and their wares are loaded directly into the lake-going steamers. Most of the buildings in the city are of cream-colored brick, which is made in the neighborhood and largely exported."

"What city is still farther north, George?"

"Duluth, said to be a rival of Chicago in handling grain."

"These lake ports present some novel features. The harbors are usually open roadsteads, protected by breakwaters and costly piers. Many of these ports are at the mouths of small rivers whose channels become the harbor proper. The river, perhaps in the heart of the city, is the scene of mills, docks, and shipping. Chicago's water front by the river is larger than Liverpool's."

"The sailing vessel," added George, "has almost disappeared from the lakes. Only a few of the cargo-carrying schooners are left, and these generally come to Chicago. The propeller with a tow of one or two vessels, succeeded the sailing fleet. These are now being succeeded by the modern steamer and whalebacks. The steamers have so much greater speed that they can make two trips to one of the propellers."

"Most of the lake commerce," said Mr. Cartmell, "consists of six articles, — namely, coal, iron ore, lumber, corn, wheat, and flour. Three fourths of the tonnage is derived from carrying the first three articles."

"Is the cost of lake transportation high or low?"

"The competition with the railroads is so great that freight rates are very low. Coal is carried from Buffalo to Duluth, one thousand miles, for thirty cents a ton. Wheat is carried from Chicago to Buffalo for two and a half cents per bushel. The cost by rail would be nearly six times as much. A bushel of wheat can be carried from Minneapolis down the Mississippi River and across the Atlantic to Liverpool for twenty-five cents, and a profit be made."

## LESSON XV.

### OUR RAILROADS.

#### *Part I.*



SOUTH SHORE STATION, CHICAGO.

.THE Cartmells realized after a short stay in Chicago that the city was a great railroad centre. Some of the finest buildings which they saw in the city were railroad stations. The Union Station and the

one on Wells Street are both fine specimens of railroad architecture.

“Do you remember, Fred, how much business seemed to be carried on by the *Michigan Central*, the road over which we came to this city?”

“Yes, indeed.”

“Well, multiply that amount of business by twenty-five, and we may get some idea of the enormous amount of railroad traffic in this, the greatest railroad centre in the world. I suppose more trains arrive and depart from Chicago daily than from any other place upon the surface

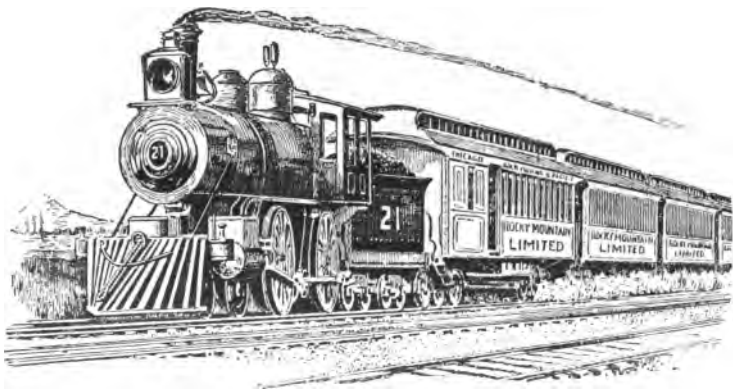
of the earth. It is well for us all to remember to what an extent railroads have, during the last fifty years, changed the world, and advanced civilization. There are over one hundred and sixty thousand miles of railroad in the United States, which is one half the mileage in the world."



PARLOR CAR.

The Cartmells made arrangements to leave Chicago on the day following that on which the above conversation took place. They planned to go west by the Chicago and Alton Railroad to Kansas City and Denver. At the station of this road the children took a survey of the "California Express" train, in which they were to begin their westward trip. They found it to be a solid vestibuled train of four sleepers, a smoker, a dining room, and a parlor coach, United States mail and baggage cars. The

sleepers were from the Pullman manufactory; so was the dining car. The boys examined carefully the locomotive, which seemed to be of the largest size, with large driving wheels and fire-box, constructed especially for fast running.



TRAIN OF CARS.

The fireman and engineer were carefully looking over the engine and oiling certain parts, so as to be ready the moment the signal was given.

After the train started, of course everybody was watching the scenery and the industries along the route. The State of Illinois as seen from the car windows was as level as a floor.

The children by and by gathered about their father and began to ask questions.

"Is this a very fast train, Papa?"

"It runs, I think, about forty miles an hour."

"That is fast enough for me," said Mrs. Cartmell.

"Is not the American engine superior to the English engine?" inquired Fred.

"I think not in speed, Fred; but the American locomotive is always supplied with a swivelling truck under the front end of the engine, which enables it to run around curves without jumping off the track. This great invention enables us to build railroads at much less expense than the English have done, whose engines are usually built without this improvement, and hence they can run only on straight tracks. Our cars are now built on four-wheeled swivelling trucks, one at each end of the car, thus enabling them to follow the locomotive around the sharpest curves."

"What is the cost of locomotives and cars, Father?" inquired Florence.

"The engine which is now drawing us over these level prairies probably cost fourteen thousand dollars, and weighs seventy-five tons. Sleepers after this make cost not far from fifteen thousand dollars each, and the other cars in proportion, so that our train represents property worth about one hundred and fifty thousand dollars."

"Does it cost much to build a railroad across these level prairies, Father?" George asked.

"Not compared with the cost in most parts of New England or in the Rocky Mountains. The average cost per mile is about thirty thousand dollars, but in this State it cannot be more than one half as much."

"How do people go to work to build a railroad?"

"First, surveys are made, and maps and sections of the proposed road are drawn, compared, and carefully considered, to find out the shortest and easiest route of going from one place to another.

"After the line has been selected with care, the different sections are let to contractors to make according to plans

and terms of contract. On the prairies of the West, where the country is as level as it is here in Illinois, the roadbed is thrown up by a ditching machine, and the tracks are rapidly laid. So fast sometimes is the road built that the men live in two-story cars, which move forward as fast as

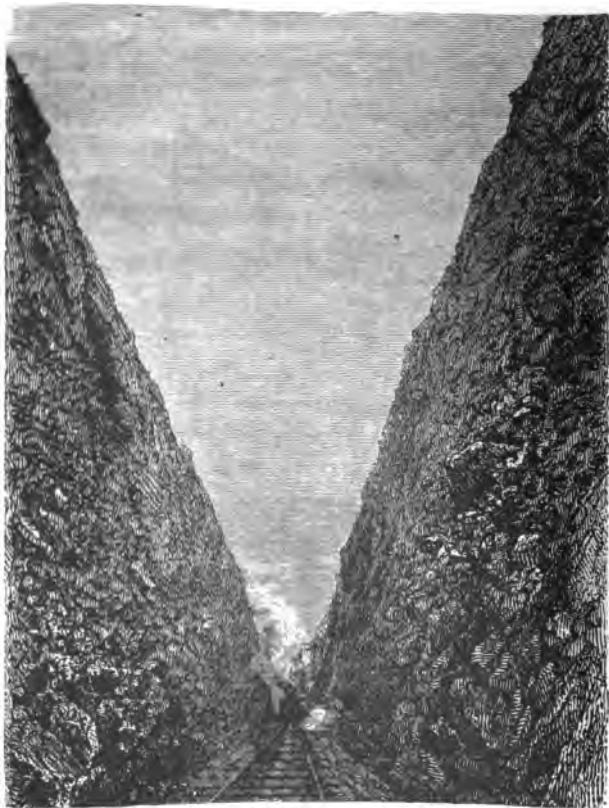


TRESTLE BRIDGE, UNION PACIFIC RAILROAD.

required. In 1887, General Shepard of St. Paul, with an army of ten thousand men, built in Dakota and Montana, in six and a half months, a line of railroad which was 545 miles long.

“When roads are built so rapidly, the bridges are usually

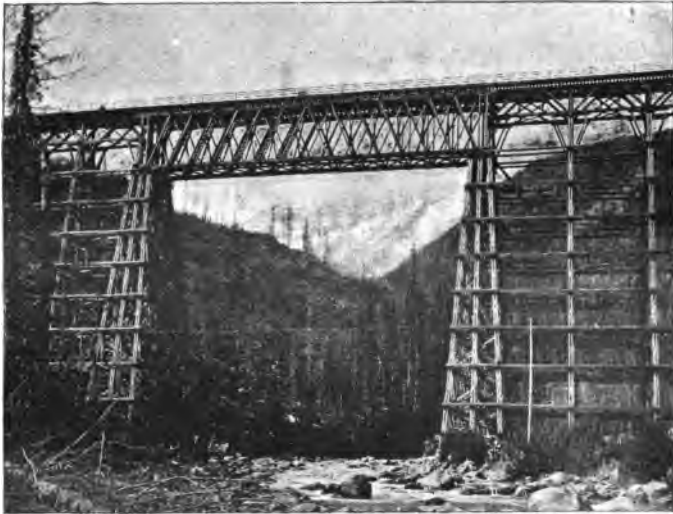
built at first of trestle work, which is filled in afterwards with earth, making embankments, or else iron or stone



THE BLOOMER CUTTING, PACIFIC RAILROAD.

bridges are finally constructed. Sometimes the valley to be crossed is so wide and deep that a wooden bridge of trestle work remains for a long time. There were some very large ones on the Union Pacific Railroad.

“Deep cuttings are now made in rocks very rapidly by the help of power-drills working by steam or compressed air, and the use of giant powder or dynamite for explosives. It takes now less than half as much time and expense to do this important part of railroad building as it did before these great inventions were made. One of the



MOUNTAIN CREEK BRIDGE, CANADIAN PACIFIC RAILROAD.

deepest of these cuts on the Union Pacific is called the Bloomer Cutting.”

“Please tell us something about bridges. Do we not cross both the Mississippi and the Missouri rivers before we reach Kansas City?”

“Yes; we shall cross them to-night when we are all asleep. Miss Gray has studied bridges. She will tell you something about them.”

"As Mr. Cartmell told you a few moments ago, the early bridges were made of wood, and frequently required one and a half million feet of timber to make one of them. This is true of the great wooden structure over Mountain Creek on the Canadian Pacific Railroad.

"The rapid building of railroads all over this country, as we learned a few days ago, has made it necessary to build many large railroad bridges across wide rivers and deep ravines.

"One of the first of these great and costly bridges was the Niagara Falls Railway Suspension Bridge, erected in 1855. The span of this bridge is 821 feet, and the track is nearly two hundred and fifty feet above the raging green water below.

"This bridge is supported by four cables. The cables sustain two floors by wire ropes. The upper floor carries the railway track, and the lower floor forms the foot and carriage way. This bridge was carefully repaired in 1885, and seems to be in good condition for many years to come.

"A few years after this light, airy structure was finished, George Stephenson built the great Victoria bridge at Montreal over the St. Lawrence. It is a tubular bridge built of plates of iron bolted together like a boiler. Great strength is thus secured, but the cost is enormous, and such a bridge has thirty-two acres of iron to be painted every year to prevent rusting. When Roebling finished the Niagara bridge, Stephenson said: 'If your bridge succeeds mine is a failure.' The suspension bridge has been a success for years, and it is in use to-day, for we crossed it in safety when we came to Chicago."

"What other kinds of bridges are there, Miss Gray?"

"The suspension bridge has a modern rival in the *cantilever* bridge. The principle of this bridge is the balancing of a part of a structure on one side of a support by a part of the structure on the opposite side of the support. I will now make a drawing to help you better to understand it.



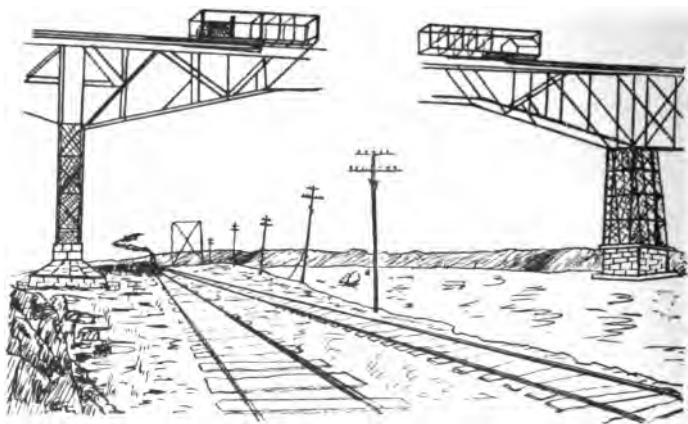
SUSPENSION RAILWAY BRIDGE, NIAGARA FALLS.

This shows the bridge partly built. By and by the two opposite parts come together in the middle of the span."

"What prevents the bridge falling in when a train of cars passes over it?" asked Fred.

"That part of the bridge-lever, on the land side," said Mr. Cartmell, "is so much heavier than the other side that a train of cars weighing two hundred tons does not tip it at all, any more than a child would tip a 'teter' if a man were sitting on the other side. Go on, Miss Gray."

“ One of the first illustrations of the cantilever bridge was the one made of steel and iron several years ago just below the suspension bridge at Niagara Falls. It is nine hundred and ten feet long, and has a clear span over the river of four hundred and seventy feet. It was built in eight months; the part over the river was built out from each side by men working on platforms suspended over



THE BUILDING OF A CANTILEVER BRIDGE OVER A RIVER.

the rushing river without apparent support. People came for miles to see the bridge when it was being built. Other celebrated bridges of this kind are the Poughkeepsie over the Hudson and the Forth near Glasgow.”

“ I suppose,” said Mr. Cartmell, “ after all Miss Gray has said about suspension and cantilever bridges, it is a fact that *truss* bridges are cheaper and more stable for railroad traffic, when good and frequent supports can be built. In many cases trusses are made of wrought iron, but lately steel has taken the place of iron. Such bridges

are very common in the West. The Missouri and the Mississippi are frequently crossed by such structures. I presume we shall to-night cross these rivers over plain steel-truss bridges. A common style of truss bridge is



A TRUSS BRIDGE.

shown in the way the railroad is carried over the Snake River in Idaho."

"What kind of bridge is the one we saw in St. Louis?" Florence asked.

"I told you," said Miss Gray, "something about this bridge when we were there. It is not a truss bridge, but consists of three steel arches, each span being over five hundred feet in length. Each span has four parallel arches, and each arch is composed of two steel tubes, eighteen inches in diameter, one above the other, twelve

feet apart. Although not a cantilever bridge, each of the middle arches was built out over the river without support, on the principle of one part balancing another."

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## LESSON XVI.

### OUR RAILROADS.

#### *Part II.*

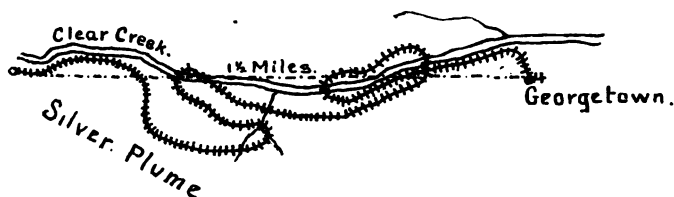
MR. Cartmell and the boys then went back to the rear car and stood for a while on the end platform, observing the country.

"Do most railroads run in as straight lines as this road does, Father?" Fred asked.

"In the Central States, on the boundless prairies, it is possible for the railroads to run long distances in 'bee' lines, but in all hilly and mountainous sections of our land such a course is impossible; the line must curve in order to avoid hills and to keep the grade uniform.

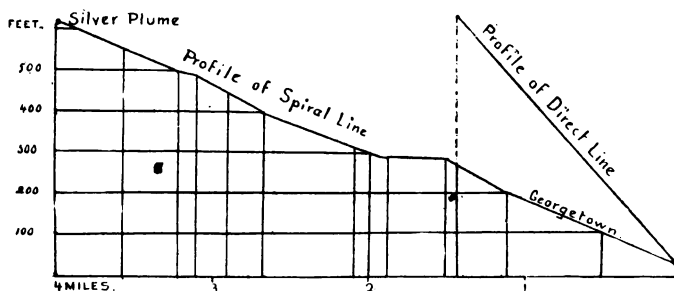
"One of the best illustrations of curves is shown in the Big Loop from Georgetown to Silver Plume, on a branch of the Union Pacific in Colorado. The direct distance up the valley is one and one-fourth miles, and the elevation six hundred feet, requiring a grading of four hundred and eighty feet in a mile. By curving the line around in the form of a spiral the length was increased to four miles, and the grading was reduced to one hundred and fifty feet per mile. I will show you sometime a plan and a profile of this wonderful road."

"I have noticed," said George, "that railroads cross mountains by following the rivers up toward the passes. The Northern Pacific, for instance, follows up the Columbia



PLAN OF RAILROAD, COLORADO, SHOWING SPIRAL.

for hundreds of miles. At the Cascades the room is not very wide for river and railroad."



ELEVATION OF THE RAILROAD.

Mr. Cartmell then returned to the parlor car, where they found the rest of the family.

"Shall we go through a tunnel to-day?" Mrs. Cartmell asked.

"No, tunnels are not common in Illinois, but are more frequently seen in Colorado. They are not so common in this country as in England, France, or Switzerland. The

longest tunnel in this country is the Hoosac in the western part of Massachusetts, which is four and three fourths miles in length."

"I remember, Papa, our riding through that tunnel when we went to Vermont last summer," said Nellie.



THE CASCADES, COLUMBIA RIVER.

"It is more common in America to carry roads around mountains by means of cuts and trestle-work, as they did on the Canadian Pacific at the 'Jaws of Death' in Thompson Canyon.

"But all the trouble about a railroad is not overcome when the track has been carefully laid. It must be kept in repair from day to day. Then in most mountainous countries there is frequent trouble from heavy falls of snow. This makes it necessary for the road to use in winter large and strongly

constructed *snow ploughs* to push or brush the snow one side. If there has been an unusual fall of snow, several engines will be needed to move the snow.

"In the Rocky Mountains cuts and defiles are each winter so filled by avalanches of snow that the railroad



WEBBER CANYON, COLORADO.

cannot be kept open without building miles of *snow sheds*, to protect the track by covering it in. There are sixty miles of these sheds on the Union Pacific. Travellers naturally object to riding in a dark shed in the summer time, so the railroad companies have in some cases built a summer track outside of the snow sheds."<sup>1</sup>

"Now, Papa, please tell me if you think it is safe to travel so much on the railroads?" said Florence.

<sup>1</sup> See pp. 188-190.



JAWS OF DEATH, THOMPSON CANYON, CANADIAN PACIFIC RAILROAD.

“Yes, my daughter. We have already travelled in the last four years many thousand miles, and never experienced the slightest accident. I feel as safe on the cars as at home. There is as much danger of being injured by lightning or by falling downstairs as there is of being hurt by an accident on a train.”

"I wish I felt so," remarked Mrs. Cartmell.

"Let me help you to feel so by quoting the figures. There are so few accidents on the cars that a person would have to travel twelve million miles before he would be injured, and fifty million before he would be killed; or to

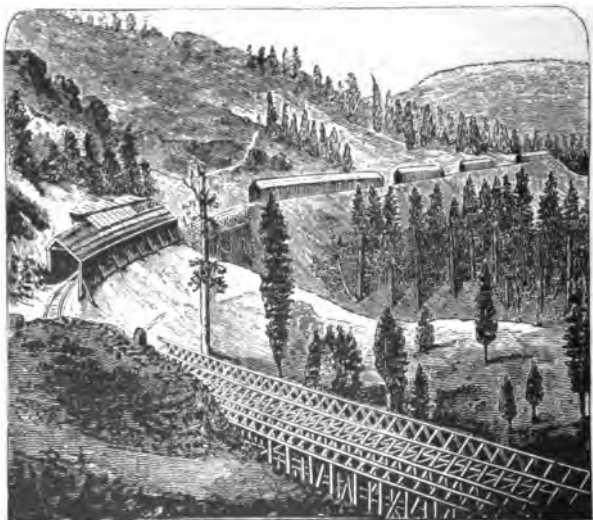


SNOW PLOUGH.

put it in another way, a person can travel day and night at the rate of thirty miles an hour for one hundred and ninety-four years before he could expect to be killed. This shows that railroad travelling is much safer than travelling in a carriage. If any one wishes anything safer he must walk."

"What makes it so safe?" Nellie asked.

"It is owing in the first place to the *faithfulness* of the persons who work upon the railroad. Our perfect safety in riding from Boston to Chicago a few days ago depended upon the faithful obedience to orders of ten thousand men



SNOW SHEDS.

who were connected with the different roads over which we passed."

"How could that be, Father?" Fred asked.

"Think, my son, of the many men who made the cars and locomotives which brought us to Chicago. Each man was faithful in making the rods, valves, bolts, wheels, and boilers, and not one broke during our trip. Think of the thousands of men who laid the track and fastened each rail securely in its place; think of the thousands of men

who acted as watchmen and switchmen, and were faithful to their trusts; think of the constant vigilance of engineers and firemen in looking out for danger, and in reading and obeying signals. If *one* of these men had forgotten, made a mistake, slept at his post, cheated in his work, we should have encountered a terrible accident. Have I made out my case, Master Fred?"

Fred said that he was very well satisfied, and then asked his father to tell about some of the special devices for securing greater safety.

"I consider one of the most important is the Westinghouse vacuum-brake used on this train. These brakes are operated from the locomotive by the engineer, and are now in general use, even on freight trains. They are sometimes called air-brakes; but the above name is more appropriate, because they act when the pressure from the engine is reduced. If a train should break in two, these brakes would instantly stop it. A train running forty miles an hour can be stopped by these brakes in about five hundred feet. The old-fashioned hand-brake used twenty years ago would require four times as much space in which to stop the train.

"Not only are good brakes necessary for safety, but those in control of the train must be informed when danger is ahead by good signals, in order that they may know when it is needful to stop the train. Our best signals now are very simple and plain,—a board moving on a pivot for the daytime, a red or a white light for night. Red light usually means danger. These signals and the movement of switches connected with them are all worked by men in signal-towers in connection with the *block system*."





INTERIOR OF A PULLMAN SLEEPING CAR.

unless he has, as Father had, several tickets for the persons in the party owning the baggage, so that the average weight of the trunks will not exceed one hundred and twenty pounds."

"In 1776," added Mr. Cartmell, "the mail was carried in some parts of this country on horseback, where now they

have a special mail train of several cars. Such a special train leaves New York for the West every night at nine o'clock, consisting of five large mail cars, express, bag-



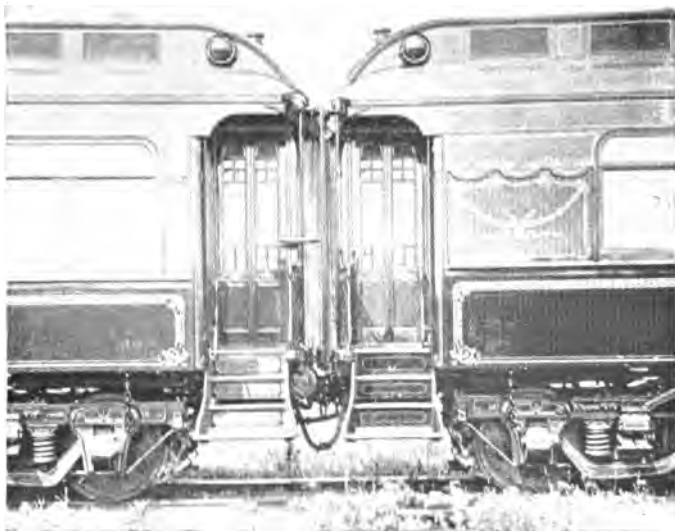
DINING CAR.

gage, and one passenger car. The mails are sorted and made up on the train."

As they were riding through the beautiful farming sections of Illinois, the conversation about railroads would frequently stop for a while and all would gaze upon the scenery. Then some one would ask a question to bring the conversation back to the leading subject.

"Is not this a fine car, Father?" inquired Fred.

"Yes, it is one of the best. The first *sleepers* in the world were run on this road in 1864 by Mr. Pullman. He boldly made them higher and wider than the ordinary car, and bridges and platforms at stations had to be changed



VESTIBULED TRAIN.

before they could be used. Parlor and drawing-room cars were next introduced for day runs.

"Then the Pullman Company introduced the hotel car, now called the buffet car, in which meals are served upon portable tables placed between the seats. After this the *dining car* was made, and it is now in frequent use, especially in the West, where the distances are so great, and time so valuable. How convenient we find these dining cars to be!

In these cars large kitchens and pantries are placed at one end, and the main body of the car is fitted up as a commodious dining-room. This makes it necessary for passengers to go from one car to another.

"At first gates were put up between the cars, but the need of something better led Mr. Pullman to make a safe passage-way between one car and another. This closed vestibule between the cars is so made as to hold the cars firmly in position, and to prevent so much side movement of the car, and also to prevent telescoping in case of an accident."

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#### LANGUAGE LESSONS.

The children are requested at this point to write sentences and use correctly the following words : —

Railroad centre, traffic, California Express, fireman, engineer, Pullman manufactory, signal, trestle, giant powder, dynamite, cantilever, balancing, suspension bridge, Niagara Falls, trusses, tunnel, accidents, vacuum-brake, switches, freight, electricity.

Write a composition about Railroads in which are used some of the following sub-divisions : —

1. American Locomotives. 2. Building a Railroad. 3. Bridges.
4. Routes of Railroads. 5. Snow Sheds and Snow Ploughs.
6. Safety. 7. Brakes. 8. Block System. 9. Vestibuled Train.

## LESSON XVII.

### INDIANS.

TO ride from Kansas City to Denver across the State of Kansas and half of Colorado consumes twenty-six hours, and covers a distance of seven hundred and fifty miles, so large are these western States. After the model prairie farms and great wheat-fields of Kansas had been observed for some time, the children became a little restless, and Mr. Cartmell gathered them about his seat for a talk.

"We are passing now, children," said their father, "across the western slope of the Great Central Plain. Where these villages, towns, cities, and modern farms now exist, a few years ago were boundless prairies and herds of countless buffaloes. Where the buffaloes roamed, the **Indians** followed them for gain and food. The Indians then lived happy hunting lives, and had no thought for the morrow, for railroads or wire fences."

"Oh, tell us something about the Indians," said Nellie.

"You promised to do so last year," said Fred.

"If you will look at this map, children, you will see the reservations where most of our Indians live. Their present homes are west of the Mississippi. Of the two hundred and fifty thousand in the United States, two hundred and twenty thousand live west of the great river. You see we are now riding between the two largest reservations in the country, the Sioux in Dakota north of us, and the In-

dian Territory, containing the Cherokees, Creeks, Choc-taws, Comanches, and Kickapoos, a hundred and fifty miles to the south. You see there are large reservations also in Montana of the Blackfoots and Crows. The Utes are

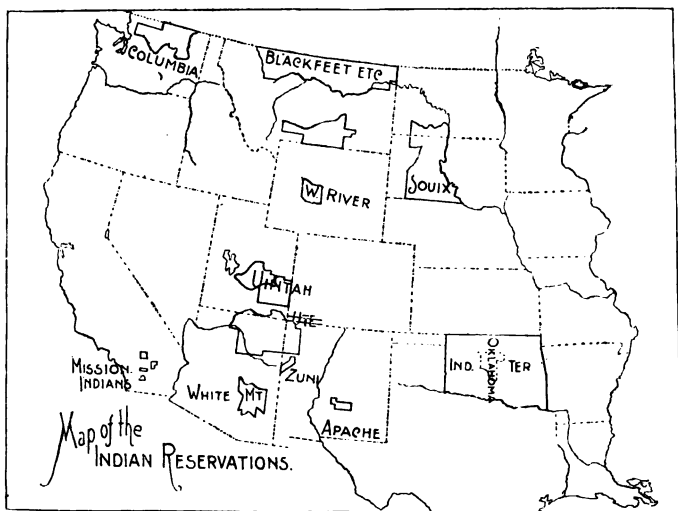


UTE INDIANS, NEVADA.

found in Colorado and the Apaches in New Mexico. Other well known tribes are scattered through the western States and territories."

"I have just been reading," said Mrs. Cartmell, "some books about the Indians, which I purchased of the paper boy. I believe the Indians *can* be civilized.

"In the southern part of the Sioux reservation in Dakota is situated the Rosebud agency. Here are some seven thousand Indians living in scattered camps or in separate



neighborhoods. Thousands of acres of land are now under cultivation. On these Indian farms are raised corn, oats, potatoes, squashes, melons, and all kinds of vegetables. The farms are fenced in with wire fences built by the Indians themselves. Warm and comfortable log houses have largely taken the place of tents and tepees. At the Pine Ridge agency about twenty-five hundred full-blooded Indians are earning a living as farmers.

"Better farming land is found in the northern part of the Sioux lands near the Missouri River. Every family there cultivates its own field or garden patch. Several Indians own mowing machines and their wives have sewing machines. Their children go to school, and are adopting the ways of white children."

"All this that you speak of, my dear wife, has been done under the operation of the Dawes bill, which became

a law in 1887. Under the provisions of this law the United States is attempting to educate the Indians into good citizens, and to cease as soon as possible treating them as a foreign nation and making treaties with them. To this end they must be taught English, and given as fast as possible allotments of land. Two thirds of the Indian children are now in fairly good schools. There are twenty



GROUP OF UTE INDIANS.

industrial schools open to them, and Congress now appropriates yearly over two million dollars for the Indians' education."

"I have learned," said Miss Gray, "that about twenty-five thousand Indians in this country live in houses; more than forty thousand full-blooded Indians labor in civilized pursuits, and about the same number can read."

"I have just purchased on the train," said George, "a paper called 'The Great Divide.' In it you can see a large picture of the 'Seven Sioux Warriors.' How intelligent they look! These men went to Washington recently

and visited the President. Let me read their queer names, — High Hawk, Little Wound, Big Road, Two Strike, Fire Lightning, Young-Man-afraid-of-his-Horses, and Spotted Elk."

"What funny names!" exclaimed Nellie.

While Mr. Cartmell and the children were looking at the map showing the Indian reservations, a fellow traveller who saw the map spread out as he was passing stopped by the group and entered into conversation with Mr. Cartmell. He had been a life-long observer of the Indians, especially of those who formerly roamed over the plains. He was requested to give the children the benefit of his personal contact with the Red Men.

"I think the Indians are slowly dying out," said Mr. Dodge. "Small-pox, measles, cholera, and liquor are the Indians' worst enemies."

"What are some of the general characteristics of the Plain Indians?"

"Although the Indian wanders about to a great extent, yet he has the strongest possible 'home' attachment and the most ardent love for country. Their country is the territory where they have been accustomed to live. If forced to leave this they suffer greatly from homesickness.

"The Indian, I have noticed, possesses remarkable powers of speech-making. This is best shown in his efforts before his own people.

"In the presence of strangers the Indian is reserved and silent; but in his own camp he is noisy, jolly, brimful of practical jokes, laughing, singing, dancing, and yelling for hours at a time.

"The Indian is honest after a fashion of his own. Hide some article from him, and he will try to find it and steal

it; but place a valuable article in his possession for safe-keeping, and he will return it to you, asking a present to pay for his honesty."



INDIAN SQUAW AND CHILD.

"Can you tell us something about the Indian children, Mr. Dodge?" Nellie asked.

"As soon as the Indian baby is born, it is put into a coffin-shaped box or cradle. This is made by cutting a piece of buffalo hide into the right shape, and then fasten-

ing it to a board, or to two boards joined together in the form of a cross. Here it stays nearly all the time for the first year of its life. The baby's clothing is a dressed deer-skin or a piece of thick cotton cloth, covering the whole body below the neck. To the board is fastened a strap, which passes over the head and rests on the mother's chest and shoulders, leaving her arms free. When at work about the lodge, the mother stands the cradle in a corner or at the foot of a tree. Sometimes it is hung to a branch.

"When the baby is a year or more old, it is carried on the mother's back, supported by the blanket which is thrown round both. An Indian woman will play a lively game of ball with a baby on her back. By and by the same child will be tied to a horse and the horse turned loose to run about the camp. In this and similar ways boys and girls learn to be good riders. An Indian baby is taught as its first lesson not to cry, by the mother putting her hand over its mouth every time it attempts to make a sound. Indian mothers are often willing to sell their babies for a small sum of money.

"Indian boys and girls seldom play together. The boys with bows and arrows roam about shooting at every animal or bird they can find, and between twelve and sixteen years of age, band together and make daring attacks, or enter into terrible combats in pursuit of fame. The girls are fond of dolls, and play with them very much as white girls do. The girls are early taught to mind the moment they are spoken to, and to work almost as soon as they walk."

"When do they marry?" Miss Gray asked.

"The women marry early, frequently before they are sixteen. As soon as a boy has been proclaimed a warrior

he begins to look for a wife. Perhaps he asks his father to buy one for him, in much the same spirit a white youth asks his father to get him a bicycle or a boat. The fathers of the girl and youth agree upon the price to be paid to the father of the girl. The ponies and buffalo robes



INDIAN BRIDE AND BRIDEGROOM.

are taken over to the lodge of the mistress, and the next day the girl comes to her lover. There is no marriage ceremony."

"Please describe the homes of the Indians as you have seen them, Mr. Dodge."

"The home of the Indian is sometimes called a *wigwam* and sometimes a *tepee*. The latter on the plains is generally a conical tent, made of buffalo skins or cotton cloth stretched around a framework of light poles. It is usually

from twelve to eighteen feet in diameter and about twelve feet high. Two smart women can put up such a residence in five minutes. The fire is built in the centre, and the smoke is supposed to escape through a hole in the top. Indians always prefer to sleep under cover. The beds are



usually piles of buffalo robes which serve as seats and lounges by day.

"The furniture of an Indian home consists of a little bedding, extra clothing, and finery, a box containing dried meat, an iron pot or two, a kettle, a few tin cups, and a water pail. There is never any order in the arrangement of these in the hut.

"There is usually only one meal a day, but no regular hour for it. A pot full of meat is put on the fire. When boiled sufficiently it is placed in the centre of the tepee, and everybody helps himself with knives or fingers. Indians now like bread, and many of the squaws have learned how to make good biscuits.

"The Indians are great eaters, and many stories are told of the large amount of meat eaten at one time. An Indian

guide much liked and petted at a western garrison was always invited, if he happened to be present, to sit down to the meal with the officers. It was soon learned that he timed his visits so as to commence with the earliest and finish with the latest morning meal in the camp, thus

securing four or five different breakfasts with as many different officers."

"What are the common weapons of the Indians, Mr. Dodge?"

"The bow and arrow is the natural weapon of the Indian. Although most Indians now have guns, the bow is still largely used, especially in hunting. Indians can fire arrows so rapidly that the last will be on its flight before the first has reached the ground.

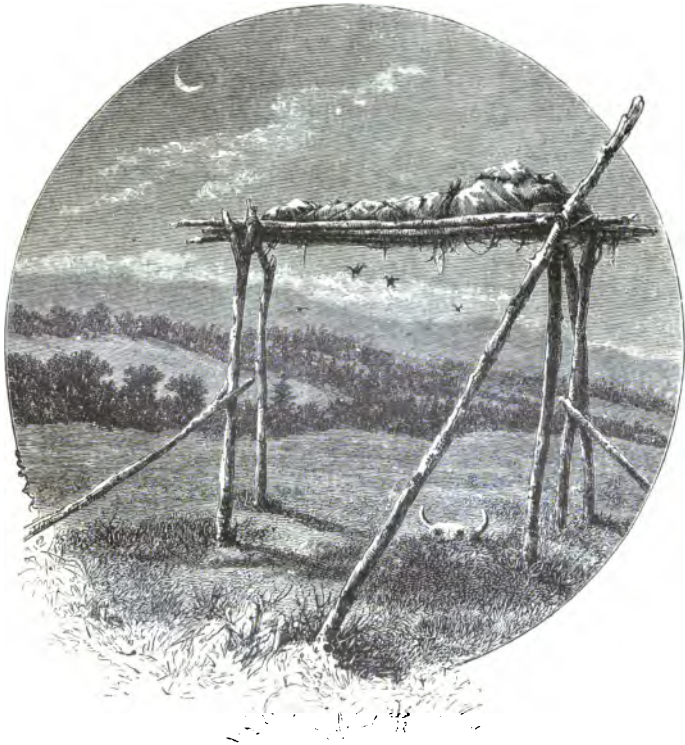


INDIAN WEAPONS, ETC.

The tomahawk is not used now to any extent as a weapon. Indians in battle generally carry a shield made of the hide from the neck of a buffalo or ox. This will frequently turn a bullet."

"The Indian," said Mr. Cartmell, "I suppose has a good deal of brute courage, but knows nothing of courage and death for the sake of principle or patriotism. He is patient and cunning, and tries to surprise the enemy; but he is very nervous in the territory of another tribe, and is easily 'stampeded' or frightened into a run. An Indian,

like a grizzly bear, is very tenacious of life, and not easily killed. In fighting with white men, surprise and ambuscade are still relied on for success. Indians armed with



INDIAN GRAVE.

breech-loading rifles and well mounted on good ponies are fine specimens of good soldiers."

"You are right, Mr. Cartmell, from my observations, and you agree with Francis Parkman," said Mr. Dodge.

“How do the Indians bury their dead?”

“The Plain Indians frequently bury the dead in trees. In many parts of the Plains the trees are too small for this purpose. Then four or five poles are set in the ground, and a platform constructed on their tops, about seven feet high, just out of reach of the wolves. Upon the platform are spread grass or leaves and small boughs of trees. Over these are placed one or two buffalo robes. The corpse is placed here, usually lying on the back in a natural position. Around the neck is tied the medicine bag, and by his side, lance, arrows, his ‘totem’ skin, and all the scalps he has taken in life. Food for the journey to the Happy Hunting Grounds, and pots and kettles to use in cooking it are placed near the body.”

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### MEMORY GEMS.

THE poetry of earth is never dead.

KEATS.

Lone in the light the prairie lies  
Wrapt in a dream of God.

JOHN HAY.

Mountains interposed  
Make enemies of nations, who had else  
Like kindred drops been melted into one.

COWPER.

Nor kings nor wealth shall this land rule,  
Nor soldiers armed with guns;  
But college and the common school  
Train up the noblest sons.

KING.

Jog on, jog on, the foot-path way,  
And merrily hent the stile-a :  
A merry heart goes all the day,  
Your sad tires in a mile-a.

SHAKSPEARE.

## LESSON XVIII.

### THREE SONGS.

#### THE RAILROAD.

THROUGH the mold and through the clay,  
Through the corn and through the hay,  
By the margin of the lake,  
O'er the river, through the brake,  
O'er the bleak and dreary moor,  
On we hie with screech and roar !  
    Splashing ! flashing !  
    Crashing ! dashing !

Over ridges,  
Gullies, bridges !  
By the bubbling rill,  
    And mill —  
Highways,  
Byways,  
    Hollow hill —  
Jumping, bumping,  
Rocking, roaring  
    Like forty thousand giants snoring ;  
By the lonely hut and mansion,  
By the ocean's wide expansion —  
Where the factory chimneys smoke,  
Where the foundry bellows croak —  
    Dash along !  
    Slash along !

Crash along !  
Flash along !  
On ! on ! with a jump,  
And a bump,  
And a roll,  
Hies the fire-fiend to its destined goal !

O'er the aqueduct and bog,  
On we fly with ceaseless jog ;  
Every instant something new,  
Every instant lost to view ;  
Now a tavern, now a steeple,  
Now a crowd of gaping people,  
Now a hollow, now a ridge,  
Now a crossway, now a bridge, —  
Grumble, stumble,  
Rumble, tumble,  
Fretting, getting in a stew !  
Church and steeple, gaping people  
Quick as thought are lost to view !  
Everything that eye can survey,  
Turns hurly-burly, topsy-turvy !  
Each passenger is thumped and shaken,  
As physic is when to be taken.

By the foundery, past the forge,  
Through the plain and mountain gorge,  
Where the cathedral rears its head,  
Where repose the silent dead !  
Monuments amid the grass,  
Flit like spectres as you pass !  
If to hail a friend inclined —  
Whish ! whirr ! ka-swash ! he's left behind !  
Rumble, tumble, all the day,  
Thus we pass the hours away.

## THE LIGHTHOUSE.

THOMAS MOORE.

THE scene was more beautiful far to my eye  
Than if day in its pride had arrayed it ;  
The land-breeze blew mild, and the azure-arched sky  
Looked pure as the Spirit that made it.  
The murmur rose soft as I silently gazed  
On the shadowy wave's playful motion,  
From the dim distant hill, till the Lighthouse fire blazed  
Like a star in the midst of the ocean.

No longer the joy in the sailor-boy's breast  
Was heard in his wildly-breathed numbers ;  
The sea-bird had flown to her wave-girded nest,  
The fisherman sunk to his slumbers :  
One moment I looked from the hill's gentle slope,  
All hushed was the billows' commotion ;  
And I thought that the Lighthouse looked lovely as Hope,  
That star of life's tremulous ocean.

The time is long past, and the scene is afar,  
Yet, when my head rests on its pillow,  
Will memory sometimes rekindle the star  
That blazed on the breast of the billow.  
In life's closing hour, when the trembling soul flies,  
And Death stills the heart's last emotion,  
Oh, then may the seraph of mercy arise,  
Like a star on eternity's ocean.

## OUR WESTERN WHEAT-FIELDS.

MRS. E. P. MILLER.

No more in the wilds of the West,  
Does the bison or buffalo roam ;  
No more does the whoop of the Red Man resound,  
For the West is the grain-grower's home.



And the broad, level acres are ploughed  
In the Fall or the Spring, till they laugh ;  
While the rain-laden air and the sunshine so rare,  
Like a nectar, the deep furrows quaff.

Then the grain, which our forefathers strewed,  
Gently swinging their arms o'er the ground,  
Is now sown with a will, by the new-fashioned " Drill,"  
Which the horses draw proudly around.



And like magic, a carpet of green  
Is spread, far as the eye can behold ;  
To the East, 't is confest, and to North, South, and West,  
'T is but emerald, treasuring gold.

Yes, and gold these broad fields soon will flaunt  
Over miles, ay, and miles, 'cross the wold ;  
For 't is golden, the grain, and 't is gold in the grain,  
That the graceful heads closely enfold.

No olden-time sickle may reap ;  
No cradle swing here for its swath ;  
But the " Harvester " true, will just rush the grain through,  
While its " Binder " binds sheaves in the path.

And the gleaners of eld are unknown,  
So few are the heads scattered 'round,  
But the sheaves into shocks are heaped up like hay-cocks,  
And seem almost to cover the ground.

Thus, each nodding to other, they stand  
Even weeks, till they ripen and dry,  
For no barns and no sheds could take in all the heads  
Which these miles of wheat-fields over-lie.

And no more may we list the whack, whack,  
Of the flail and its neighbor-flail old ;  
But the steam-“ Thrasher ” grand in the field is at hand,  
And there threshes the sheaves for their gold.

Then the straw, crushed and broken, is burned ;  
But the golden grain, pouring a river,  
Is soon sent to the mills 'mongst the far-away hills ;  
And for flour and for bread, bless the Giver !

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### QUESTIONS IN REVIEW.

1. What did the Cartmells see in Florida?
2. How much can you tell about the “ Crescent City ”?
3. What is there peculiar about a Mississippi River steamer?
4. Where would you go to find a city lighted and heated by “ Natural gas ”?
5. How is petroleum oil now conveyed from the wells to the lamps in your house?
6. What is a Davy lamp?
7. What is Manual Training? A Kindergarten?
8. How is a lighthouse lighted?
9. How did the Cartmells go from their home to Chicago?
10. In what way is Jackson Park connected with Columbus?
11. What is the difference between a cantilever bridge and a suspension bridge?
12. What are some of the characteristics of the Indians?

## LESSON XIX.

### A REVIEW BY POEMS.

THE Cartmell family were great lovers of good poetry, and the different members were frequently quoting extracts or reading selections suitable to the places visited or the subjects discussed. Mrs. Cartmell and Miss Gray had especially good memories for poetry, and often entertained the others by well chosen quotations. When they were travelling in North Carolina, Miss Gray told the children about Professor Mitchell, who lost his life exploring the Black Mountains. He was buried on Mount Mitchell. Miss Sigourney's beautiful poem was repeated to the children by their teacher. The first stanza is as follows: —

“Where is he, Mountain Spirit?  
Dread Mountain Spirit, say!  
That honored Son of Science  
Who dared thy shrouded way?  
O giant firs! whose branches  
In gloomy grandeur meet,  
Did ye his steps imprison  
Within your dark retreat?”

When South Carolina was reached, Mrs. Cartmell spoke of historical times, and repeated some stanzas from the “Song of Marion’s Men,” which begins, —

“Our band is few, but true and tried,  
Our leader frank and bold.”

Fred said he liked better than the "Song of Marion's Men" Whittier's "At Port Royal," which contains the "Song of the Negro Boatmen." He was asked to repeat the song, but could only remember the last stanza.

"We know de promise nebber fail,  
An' nebber lie de Word ;  
So like de 'postles in de jail,  
We waited for de Lord ;

An' now he open ebery door,  
An' trow away de key ;  
He tink we lub him so before,  
We lub him better free.  
De yam will grow, de cotton  
blow,  
He 'll gib the rice an' corn ;  
Oh, nebber you fear, if nebber  
you hear  
De driver blow his horn."



While riding through Savannah, Mrs. Cartmell said, "This was the scene of Jasper's heroic act in saving the colors in the American Revolution, which Mr. Charlton has celebrated in his poem

beginning, —

"'T was amidst a scene of blood  
On a bright autumnal day,  
When misfortune, like a flood,  
Swept our fairest hopes away ;  
'T was on Savannah's plain,  
On the spot we love so well,

Amid heaps of gallant slain,  
That the daring Jasper fell ! ”

Florida suggested to our travellers many poems. Again and again they sang the different stanzas of the “ Old Folks at Home.” The first one is given below : —

“ Way down upon de Swanee ribber,  
Far, far away,  
Dere ’s whar my heart is turning ebber,  
Dere ’s whar de old folks stay.  
All up and down de whole creation,  
Sadly I roam,  
Still longing for de old plantation,  
And for de old folks at home,  
All de world am sad and dreary  
Ebry whar I roam,  
Oh, darkeys ! how my heart grows weary  
Far from de old folks at home.”

George found in one of the Florida papers a stanza by a local poet, Mrs. B. C. Rude, which he read one evening. It was entitled “ St. Augustine,” and was as follows : —

“ Fair St. Augustine, Nature’s winter queen,  
Languidly is lying  
In her summer dress of rarest loveliness,  
Listening to the sighing  
And the steady moaning and the weary groaning  
Of the Sea.  
Sails are idly flapping, boatmen soundly napping,  
Dreaming are we.”

Florence thought that the anonymous poem on St. Augustine which she found in Vol. XXVIII. of “ Poems of Places,” was very fine. A part of it is here given.

## ST. AUGUSTINE.

“ In the realm of flowers, a perfumed land,  
Girt by the sea, by soft winds fanned,  
Ravaged by war in years grown old,  
Its former glory a tale long told,  
Stands the quaint old Spanish city.

“ The scene of many a hard-fought fight,  
Of many a siege, when Spanish might  
Was o’er the land ; in its decay  
It hath a beauty to live away,  
That quaint old Spanish city.

“ There ’s a charm in the ancient narrow street,  
Where lovely dames erst walked to meet  
Cavaliers in the days gone by,  
When strife of valor and love ran high,  
In the quaint old Spanish city.”

On the way from Florida to New Orleans, Mrs. Cartmell spoke of a New England poet by the name of Brownell.

“ What has he written, Mamma ? ” Nellie asked.

“ I remember three of his poems, — ‘ The Burial of the Dane,’ ‘ The River Fight,’ and ‘ The Bay Fight.’ The last is one of the longest poems that I have read on such a subject. The scene of the poem is Mobile Bay.”

“ Are there any poems on the Mississippi River ? ” Fred inquired.

“ I have found,” replied Florence, “ several in ‘ Poems of Places,’ but only one interests me. That is written by John Hay. I will read you the first stanza. It is entitled —

## ON THE BLUFF.

“O grandly flowing river !  
O silver-gliding river !  
Thy springing willows shiver  
In the sunset as of old ;  
They shiver in the silence  
Of the willow-whitened islands  
While the sun-bars and the sand-bars  
Fill air and wave with gold.’ ”

Miss Gray said that she once read a long poem called “Songs of the Mississippi,” by a Mr. Smoote, but she only remembered a few lines, describing an overflow of the stream.

“T was thus he gathered strength on every side  
Which sent him on his wild, resistless way.  
Whatever met him yielded to his force.  
Uprooted forests floated on his breast ;  
Towns were submerged, and cotton fields o’erwhelmed,  
While teeming cities trembled as he passed,  
And felt his power close upon their halls.  
All man’s vain efforts to confine his course  
Were fiercely dashed aside, and spurned in scorn,  
And man himself stood by in helpless awe,  
And saw the ruin which he could not check.”

When the Cartmells were in Pittsburg they saw so much accomplished by steam that it reminded each one of the beautiful poem by George W. Cutter, entitled “The Song of Steam.” The different stanzas were repeated by the members of the party. Fred gave this one, —

“I blow the bellows, I forge the steel,  
In all the shops of trade,

I hammer the ore and turn the wheel  
 Where my arms of strength are made.  
 I manage the furnace, the mill, the mint,  
 I carry, I spin, I weave.  
 And all my doings I put in print  
 On every Saturday eve."

George repeated the last one, —

"I've no muscles to weary, no breast to decay.  
 No bones to be 'laid on the shelf,'  
 And soon I intend you may 'go and play,'  
 While I manage this world myself.  
 But harness me down with your iron bands,  
 Be sure of your curb and rein;  
 For I scorn the strength of your puny hands,  
 As the tempest scorns a chain."

Miss Gray, while travelling from Pittsburg to Philadelphia, thought of a poem which she once saw in a Reader written by H. Clay Preuss, and entitled "Honor to Workmen." She recalled the second stanza, as follows: —

"Who spans the earth with iron,  
 And rears the palace dome?  
 Who fashions for the rich man  
 The comforts of his home?  
*It is the patient toiler,*  
 All honor to him then!  
 The true wealth of a nation  
 Is in her working-men."

Reference to this poem suggested to Mrs. Cartmell "Tubal Cain" by Charles Mackay, which begins thus:

"Old Tubal Cain was a man of might  
 In the days when the earth was young;  
 By the fierce red light of his furnace bright,  
 The strokes of his hammer rung."

The trip which the Cartmells made "Along the Coast" and "Among the Lighthouses," suggested a number of poems by Whittier, Longfellow, and Celia Thaxter. Florence quoted Longfellow on the lighthouse:—

"The mariner remembers when a child,  
On his first voyage, he saw it fade and sink;  
And when returning from adventures wild  
He saw it rise again o'er ocean's brink.

Steadfast, serene, immovable, the same  
Year after year, through all the silent night,  
Burns on forevermore that quenchless flame,  
Shines on that inextinguishable light!"

Mrs. Cartmell recited with feeling Thomas Moore's poem, which is given in Chapter XVIII. George repeated the following stanza about the ocean:—



A LIGHTHOUSE.

"How calm was the ocean! how gentle its swell!  
Like a woman's soft bosom, it rose and it fell;  
While its light sparkling waves, stealing laughingly o'er,  
When they saw the fair rainbow knelt down on the shore.  
No sweet hymn ascended, no murmur of prayer,  
Yet I felt that the spirit of worship was there;  
And I bent my young head in devotion and love,  
'Neath the form of the angel that floated above."

As the Cartmell party were travelling westward through New York State, quotations were frequently made by

them from suitable poems referring to the Mohawk Falls, Lake Saratoga, Ticonderoga, Trenton Falls, Seneca Lake, Genesee River, and Lake Ontario. Niagara Falls suggested a number of poems. Mrs. Cartmell repeated a part of Brownell's poem beginning, —

“Has aught like this descended, since the fountains  
Of the great Deep broke up, in cataracts hurl'd,  
And climbing lofty hills, eternal mountains,  
Poured wave on wave, above a buried world?”

Mr. Cartmell read the pathetic story of Avery, who went over the falls in 1853, as given in poetical form by W. D. Howells; and Miss Gray repeated a beautiful poem on Niagara by an unknown author. It began —

“I stood within a vision's spell;  
I saw, I heard. The liquid thunder  
Went pouring to its foaming hell,  
And it fell  
Ever, ever fell  
Into the invisible abyss that opened under.”

“Miss Gray, have you ever read any poems about the West?” Mr. Cartmell asked after they left Niagara.

“Yes, I remember two by Charles Mackay. In one of them he says, —

“‘To the West! to the West! where the rivers that flow  
Run thousands of miles, spreading out as they go;  
Where the green waving forests that echo our call  
Are wide as old England, and free to us all;  
Where the prairies, like seas where the billows have rolled,  
Are broad as the kingdoms and empires of old;  
And the lakes are like oceans in storm or in rest,  
Away, far away, to the Land of the West!’”

"What accurate descriptions the poets usually give of nature. What was the other poem you referred to by the same author?"

"The well-known one entitled 'The Pioneers.' You must recall the first lines: —

"Rouse! brothers, rouse! we've far to travel,  
Free as the winds we love to roam,  
Far through the prairie, far through the forest,  
Over the mountains we'll find a home."

When nearing Chicago, Mrs. Cartmell called the children's attention to the sweet and dainty poem by Lucy Larcom about "Elsie in Illinois."

Chicago suggested the Great Fire in 1871, and this suggested to the travellers poems by O'Reilly, Whittier, and Bret Harte. Miss Gray recalled the poem by the last, emphasizing the third stanza, —

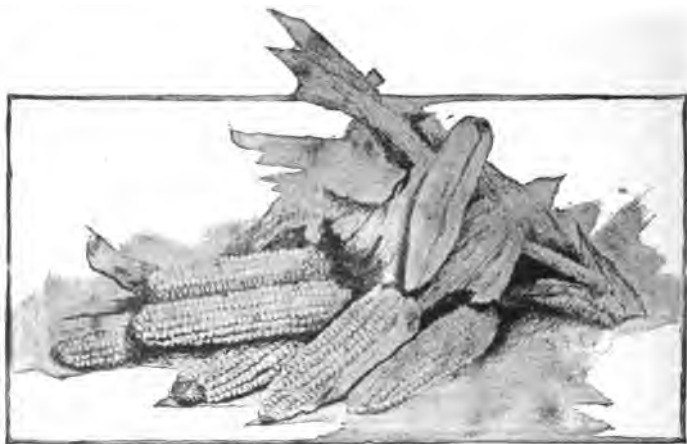
"Like her own prairies by some chance seed sown,  
Like her own prairies in one brief day grown,  
Like her own prairies in one fierce night mown."

The day that Mr. Cartmell took the children to see the grain section west of Chicago, he read to them, as they whirled along, Whittier's familiar "Corn Song," beginning:

"Heap high the farmer's wintry hoard!  
Heap high the golden corn!  
No richer gift has autumn poured  
From out her lavish horn!

"Through vales of grass and meads of flowers,  
Our ploughs their furrows made,  
While on the hills the sun and showers  
Of changeful April played.

"We dropped the seed o'er hill and plain,  
Beneath the sun of May,  
And frightened from our sprouting grain  
The robber crows away."



CORN.

George read in return a poem which he had just found in the "Century Magazine" by Edna Dean Proctor, called "Columbia's Emblem." The last stanza is the following:

"The rose may bloom for England,  
The lily for France unfold ;  
Ireland may honor the shamrock,  
Scotland her thistle bold ;  
But the shield of the great Republic,  
The glory of the West,  
Shall bear a stalk of the tasselled corn,  
Of all our wealth the best.  
The arbutus and the golden-rod  
The heart of the North may cheer,

And the mountain-laurel for Maryland  
 Its royal clusters rear,  
 And jasmine and magnolia  
 The crest of the South adorn ;  
 But the wide Republic's emblem  
 Is the bounteous, golden corn ! ”

The trip westward from Chicago to Denver suggested to the Cartmells many poems. Mrs. Cartmell repeated Bryant's "The Hunter of the Prairies," which begins, —

“ Ay, this is freedom ! these pure skies  
 Were never stained with village smoke.”

Nellie read that pathetic piece by Rose Terry Cooke, "Lost on the Prairie." Three of the stanzas are here reproduced : —

“ Oh, my baby, my child, my darling !  
 Lost and gone in the prairie wild ;  
 Mad gray wolves from the forest snarling,  
 Snarling for thee, my little child.

“ Dead and pale in the moonlight's glory  
 Cold and dead by the black oak-tree ;  
 Only a small shoe, stained and gory,  
 Blood-red, tattered, — comes home to me.

“ ‘ Here, here ! not dead, but living ! ’  
 God ! Thy goodness — what can I pay ?  
 Blessed more in this second giving,  
 Laid in happier arms to-day.”

Florence quoted from "A Prairie Ride," the first stanza, —

“Across the prairie, toward the West,  
We rode at day’s declining ;  
What radiant pictures we beheld,  
In heavenly ether shining.”



A PRAIRIE.

Miss Gray’s selection, “The Prairie on Fire,” by George P. Morris, was considered by Mr. Cartmell the finest. The last stanza is as follows: —

“On three sides then the torrent flew,  
But on the fourth no more it raved !  
Then large and broad the circle grew,  
And thus the pilgrim band was saved !  
The flames receded far and wide,  
The mother had not prayed in vain ;  
God had the Felon’s arts defied !  
His scythe of fire had swept the plain !

The subject of the Indians revived poetical recollections of this misunderstood race, Mrs. Cartmell defend-

ing them in poetry as well as in prose. She quoted in their favor from Charles Sprague's "The Indians" the following: —

"We call them savage. Oh, be just!  
Their outraged feelings scan;  
A voice comes forth, — 't is from the dust, —  
The savage was a man!  
Think ye he loved not? Who stood by,  
And in his toils took part?  
Woman was there to bless his eye —  
The savage had a heart!  
Think ye he prayed not? When on high  
He heard the thunders roll,  
What bade him look beyond the sky?  
The savage had a soul."

Miss Gray gave a part of Schoolcraft's "Indian Lament."  
The children liked this stanza, —

"I will go to my tent, and lie down in despair;  
I will paint me with black, and will sever my hair;  
I will sit on the shore, where the hurricane blows,  
And reveal to the god of the tempest my woes;  
I will weep for a season, on bitterness fed,  
For my kindred are gone to the hills of the dead;  
But they died not by hunger or lingering decay,  
The steel of the white man hath swept them away."

After Miss Gray finished, Fred read all of Longfellow's poem referring to Custer's fight on the Big Horn River, and entitled "The Revenge of Rain-in-the-Face."



# APPENDIX.

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## A LIST OF POEMS.

IN different parts of this volume, especially in Lesson XIX., quotations are made from noted poems which seem suitable to the place or subject. Additional poems and their authors are here given. Most of these poems will be found in "Poems of Places," edited by Longfellow, volumes 25-29.

### SOUTHERN STATES.

|                                           |                              |
|-------------------------------------------|------------------------------|
| THE LAKE OF THE DISMAL SWAMP . . . . .    | <i>Thomas Moore.</i>         |
| THE FISHERMAN OF BEAUFORT . . . . .       | <i>Frances D. Gage.</i>      |
| THE CATAWBA RIVER . . . . .               | <i>J. S. Kidney.</i>         |
| THE WRECK . . . . .                       | <i>T. H. McNaughton.</i>     |
| DOLORS . . . . .                          | <i>C. F. Woolson.</i>        |
| THE BLUE AND THE GRAY . . . . .           | <i>F. M. Finch.</i>          |
| ON THE HEIGHTS OF MISSION RIDGE . . . . . | <i>J. A. Signaigo.</i>       |
| ON THE SHORES OF THE TENNESSEE . . . . .  | <i>Anonymous.</i>            |
| BY CHICKAMAUGA RIVER . . . . .            | <i>Hezekiah Butterworth.</i> |
| LOOKOUT MOUNTAIN . . . . .                | <i>G. D. Prentice.</i>       |
| MAMMOTH CAVE . . . . .                    | <i>G. D. Prentice.</i>       |
| MEMPHIS . . . . .                         | <i>J. T. Trowbridge.</i>     |
| KIT CARSON'S RIDE . . . . .               | <i>Joaquin Miller.</i>       |

### PENNSYLVANIA.

|                                                            |                    |
|------------------------------------------------------------|--------------------|
| MEETING OF THE SUSQUEHANNA AND<br>THE LACKAWANNA . . . . . | <i>Sigourney.</i>  |
| VALLEY FORGE . . . . .                                     | <i>T. B. Read.</i> |

|                                  |                             |
|----------------------------------|-----------------------------|
| WYOMING . . . . .                | <i>Fitz-Greene Halleck.</i> |
| MOLLY MAGUIRE AT MONMOUTH . . .  | <i>William Collins.</i>     |
| THE SPUR OF MONMOUTH . . . . .   | <i>Henry Marford.</i>       |
| THE HIVE AT GETTYSBURG . . . . . | <i>Whittier.</i>            |
| THE SONG OF THE FORGE . . . . .  |                             |

## NEW ENGLAND.

|                                    |                       |
|------------------------------------|-----------------------|
| THE LIGHTHOUSE . . . . .           | <i>Thomas Moore.</i>  |
| THE VILLAGE BLACKSMITH . . . . .   | <i>Longfellow.</i>    |
| THE WRECK OF THE POCAHONTAS . . .  | <i>Celia Thaxter.</i> |
| PICTURES FROM APPLIEDORE . . . . . | <i>Lowell.</i>        |
| A NEWPORT ROMANCE . . . . .        | <i>Bret Harte.</i>    |

## CENTRAL STATES.

|                                                  |                           |
|--------------------------------------------------|---------------------------|
| TO THE WEST . . . . .                            | <i>W. D. Gallagher.</i>   |
| TO AN INDIAN MOUND . . . . .                     | <i>Thomas H. Shreve.</i>  |
| INDIANA . . . . .                                | <i>Anonymous.</i>         |
| AN EAGLE'S QUILL FROM LAKE<br>SUPERIOR . . . . . | <i>Whittier.</i>          |
| THE KANSAS EMIGRANT . . . . .                    | <i>Whittier.</i>          |
| THE MINNESOTA WATER-SHED . . . .                 | <i>Holmes.</i>            |
| TO CINCINNATI . . . . .                          | <i>E. A. M'Laughlin.</i>  |
| THE OLD MOUND . . . . .                          | <i>Charles A. Fones.</i>  |
| THE FALLS OF MINNEHAHA . . . . .                 | <i>Longfellow.</i>        |
| TO THE MISSISSIPPI . . . . .                     | <i>Charles T. Brooks.</i> |
| THE MISSISSIPPI RIVER . . . . .                  | <i>Sarah F. Hale.</i>     |
| THE OHIO . . . . .                               | <i>Thomas B. Read.</i>    |
| THE OHIO . . . . .                               | <i>Ephraim Peabody.</i>   |
| THE PLAINS . . . . .                             | <i>Foaquin Miller.</i>    |
| THE PRAIRIE . . . . .                            | <i>Fohn Hay.</i>          |

## BOOKS CONSULTED.

---

SOME of the more important books consulted in the preparation of Part II. are mentioned below. Teachers and readers are referred to them for further information.

|                                             |                          |
|---------------------------------------------|--------------------------|
| HOME LIFE IN FLORIDA . . . . .              | <i>Harcourt.</i>         |
| FLORIDA . . . . .                           | <i>Barbour.</i>          |
| FLORIDA OF TO-DAY . . . . .                 | <i>Davidson.</i>         |
| BRIGHT SKIES . . . . .                      | <i>H. M. Field.</i>      |
| THE GREAT SOUTH . . . . .                   | <i>Ed. King.</i>         |
| INDUSTRIES OF NEW ORLEANS                   |                          |
| THE SOUTHERN STATES . . . . .               | <i>Somers.</i>           |
| NEW ORLEANS . . . . .                       | <i>Waring and Cable.</i> |
| LIFE ON THE MISSISSIPPI . . . . .           | <i>Mark Twain.</i>       |
| THE MANUFACTURE OF IRON . . . . .           | <i>Swank.</i>            |
| UNDERGROUND LIFE . . . . .                  | <i>Simonin.</i>          |
| COAL                                        |                          |
| PETROLEUM . . . . .                         | <i>Crew.</i>             |
| THE GREAT INDUSTRIES OF GREAT<br>BRITAIN    |                          |
| EDUCATION IN THE UNITED STATES . . . . .    | <i>Boone.</i>            |
| REPORTS OF THE COMMISSIONER OF<br>EDUCATION |                          |
| ALL AMONG THE LIGHTHOUSES . . . . .         | <i>Crowninshield.</i>    |
| ANCIENT AND MODERN LIGHTHOUSES . . . . .    | <i>Heap.</i>             |
| OUR SEA MARKS . . . . .                     | <i>Edwards.</i>          |
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